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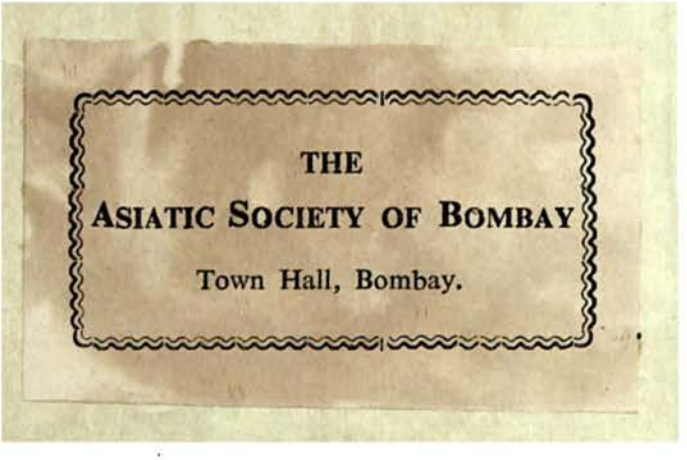

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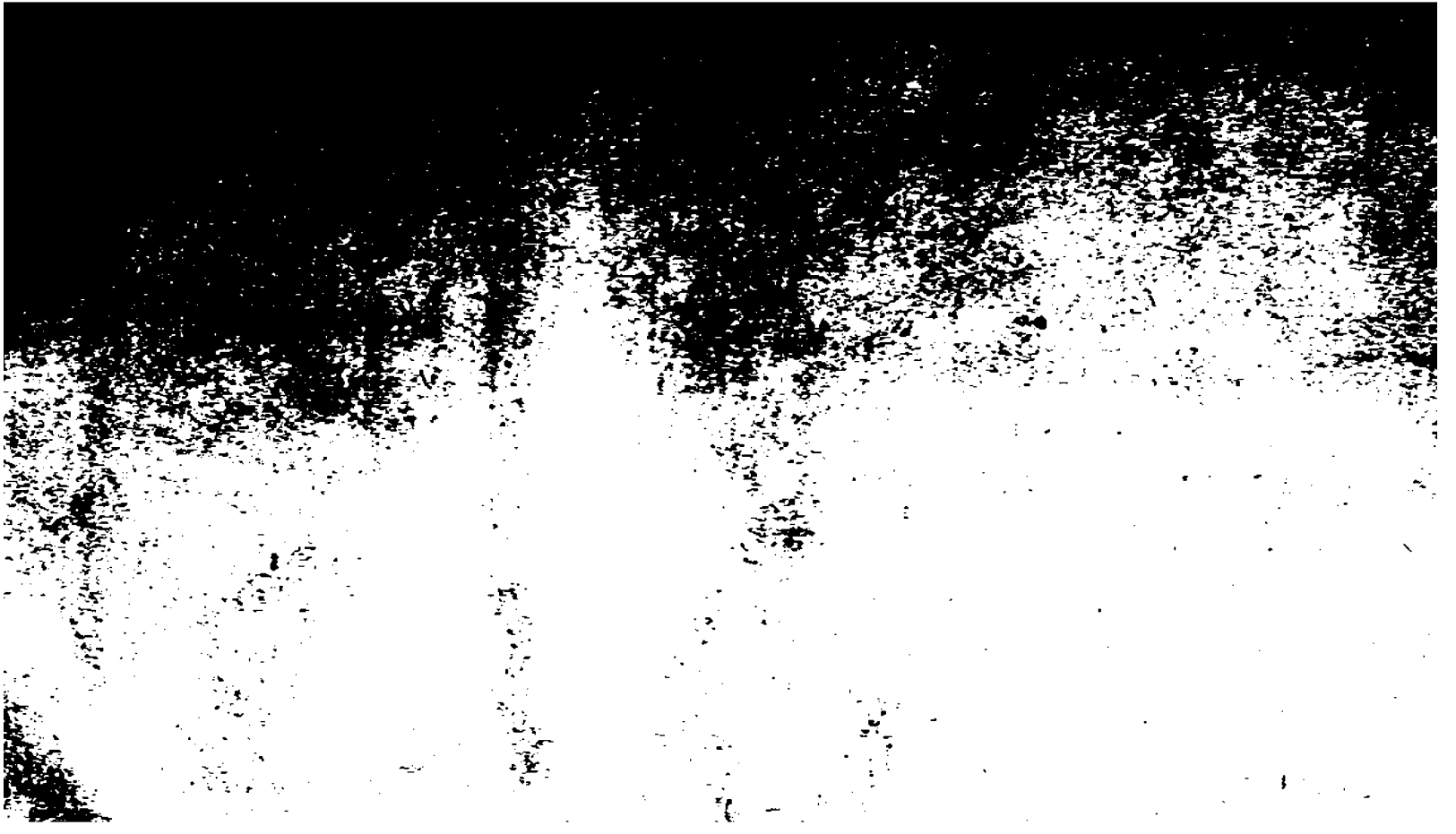

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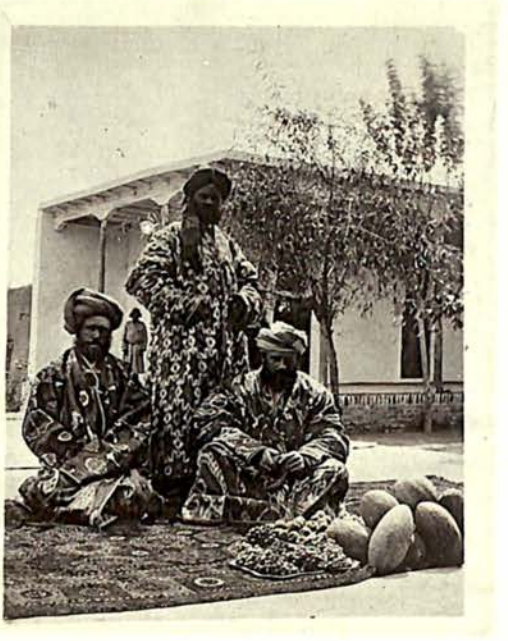

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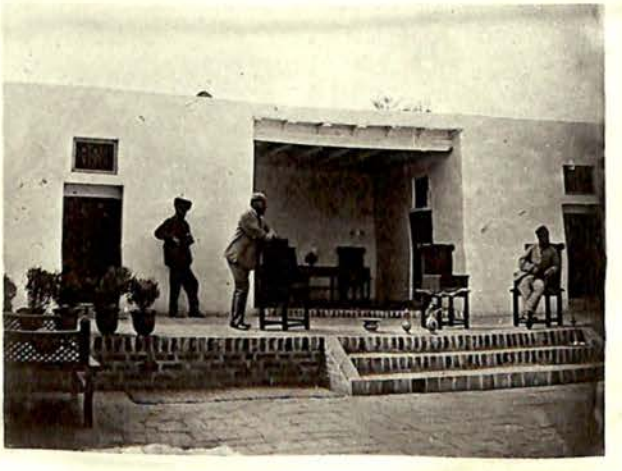
OURSELVES AT YARKAND



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OUR QUARTERS IN YARKAND FORT.

LAHORE TO YARKAND.

INCIDENTS OF THE ROUTE

AND

Natural History

OF THE

COUNTRIES TRAVERSED

BY

THE EXPEDITION OF 1870,

UNDER

T. D. FORSYTH, Esq., C.B.

£0280
ac.

BY

GEORGE HENDERSON, M.D., F.L.S., F.R.G.S.
MEDICAL OFFICER TO THE EXPEDITION, OFFICIATING SUPERINTENDENT OF THE BOTANIC GARDENS, CALCUTTA;

AND

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SECRETARY TO THE GOVERNMENT OF INDIA, FOR THE DEPARTMENT OF AGRICULTURE, REVENUE AND COMMERCE.

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TO

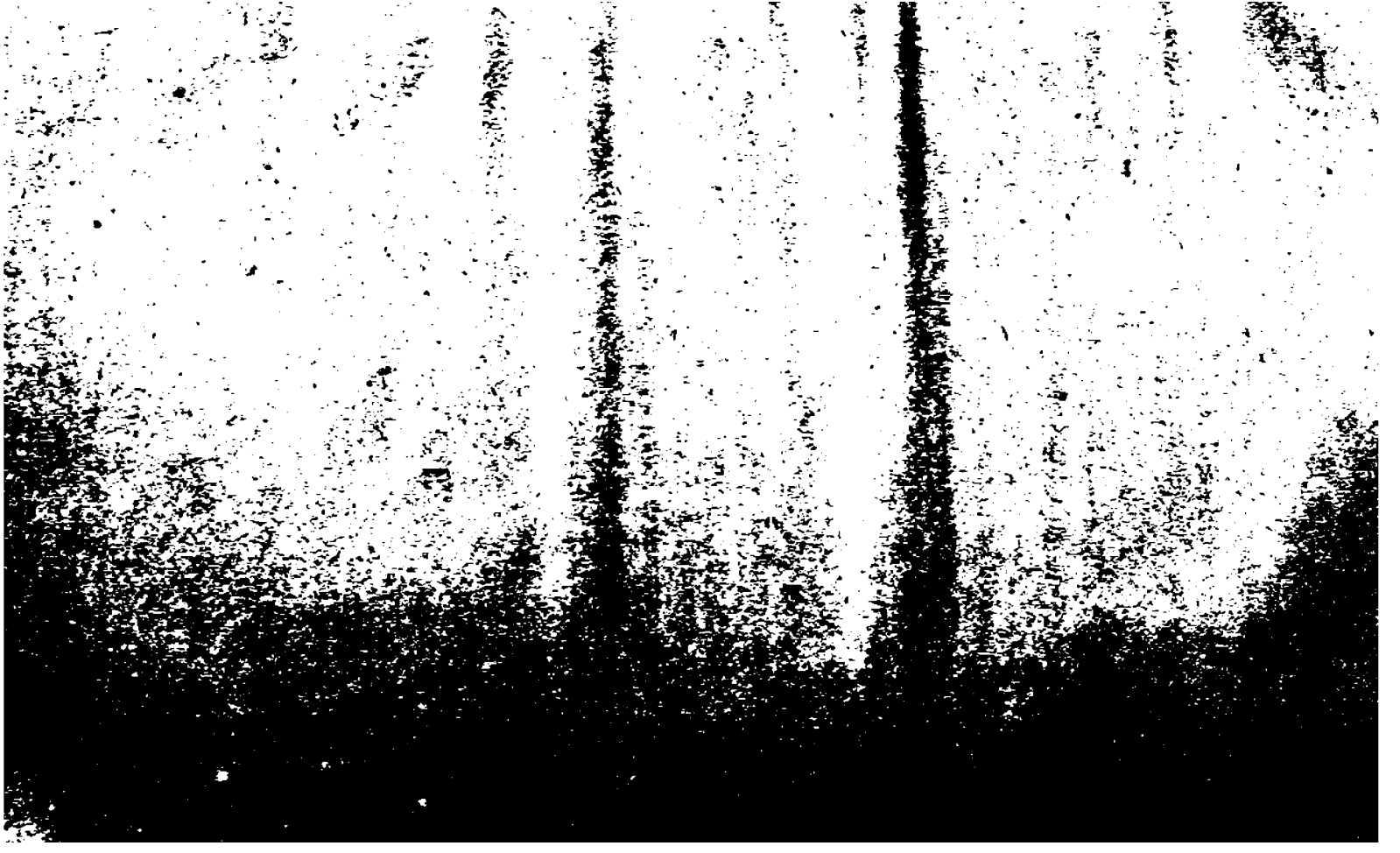
T. D. FORSYTH, Esq., C.B.

THIS REPORT ON SOME OF THE SCIENTIFIC RESULTS OF THE EXPEDITION WHICH HE SO SKILFULLY AND SUCCESSFULLY CONDUCTED,

As Affectionately Dedicated

BY HIS FRIENDS,

THE AUTHORS.



PREFACE.

On the return to India of the Yārkand Expedition it was believed that sufficient materials had been collected, during the journey, for a paper in some scientific journal, on the Zoology and Botany of the countries traversed, but in preparing the notes for the press it was soon found that their bulk was so great as to necessitate a separate volume.

After everything was ready for publication, the Secretary of State for India in Council most liberally subscribed for a number of copies of the work, sufficient to relieve the Authors of almost all risk. The sale of such a work as the present must necessarily be very limited.

The Authors have to acknowledge with thanks the assistance they have received from many kind friends. Dr. Hooker most liberally allowed the Kew Herbarium to be freely consulted in identifying the Botanical specimens, and he and Mr. Bentham have written the descriptions of the new species of flowering Plants, all of which have been figured by Mr. Fitch, under Professor Oliver's supervision; and Mr. James

Britten, late of the Kew Herbarium and now of the British Museum, gave very great assistance in identifying specimens of Plants; he also kindly undertook to revise the proof sheets of the botanical portion of the work. The identifications and descriptions of Algæ, Diatomaceæ, &c., as also the drawings of these, are by Dr. Dickie of Aberdeen, Mr. Fitch having lithographed the drawings.

The Ornithological portion of the work has been edited by Mr. R. B. Sharpe, and Mr. H. W. Bates has exercised a general supervision over the work, whilst it was passing through the press. The analysis of the water of the Pángong Lake was kindly undertaken by Dr. Frankland, and is published with his permission. Mr. Etheridge, of the Royal School of Mines, kindly identified the only fossil which was found in Yārkand territory, and his prognostication that coal would probably be found in Yārkand has already turned out to be true, for Mr. Shaw has informed Dr. Henderson that specimens of coal have since been obtained in Yārkand territory.

Mr. Scott, of the Board of Trade Meteorological Office, kindly allowed the observations of the barometer, boiling-point thermometer, and the wet and dry bulb thermometer to be worked out in his office.

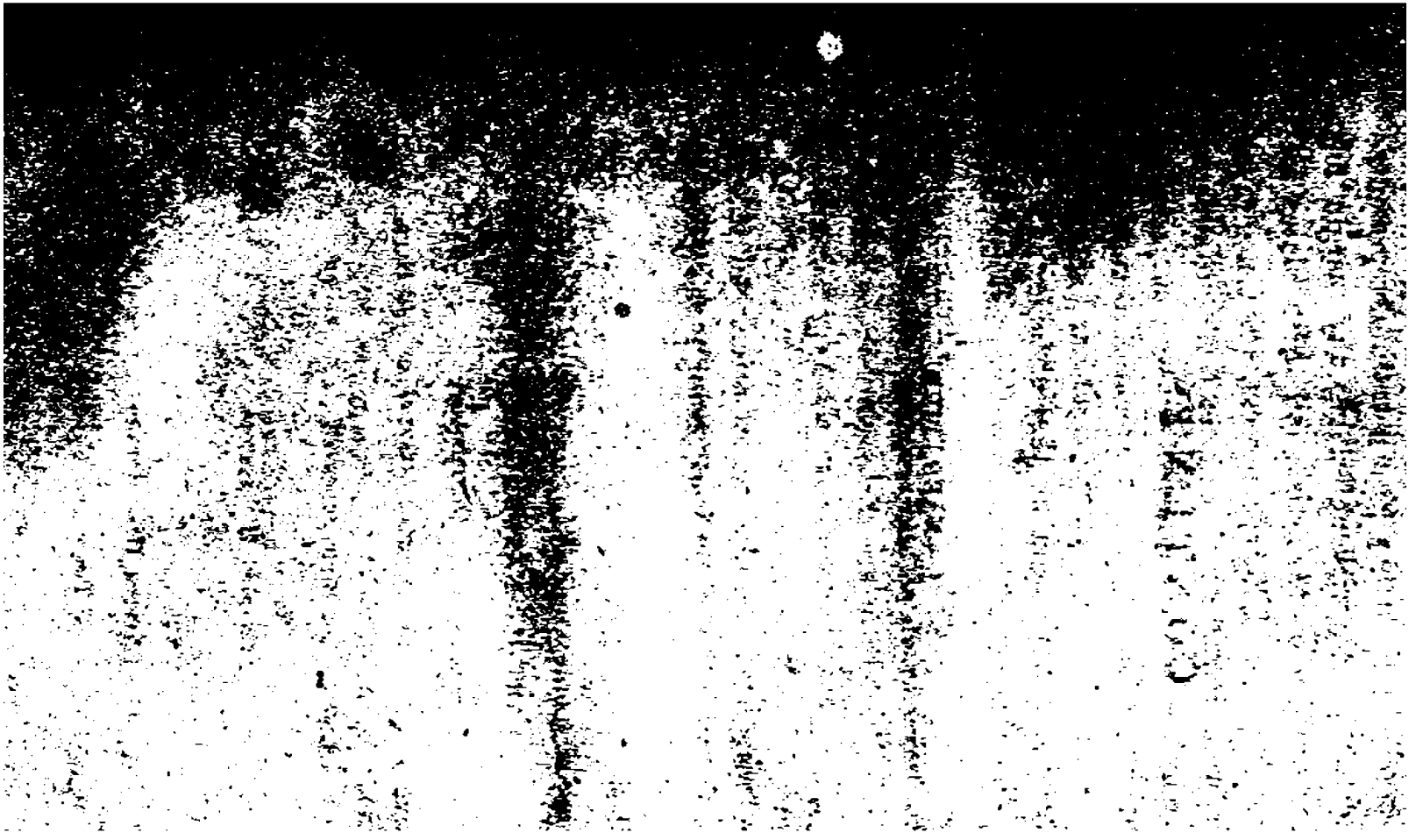
The Map was drawn by Mr. Oulet at the Royal Geographical Society's rooms, under the supervision of Mr. Bates.

The Plates which illustrate the Narrative, if not all works of art, have at least this recommendation

over woodcuts, that they give a truthful representation of the places, without leaving any margin for the imagination of the artist; all these Plates are done by the new Heliotype process, from negatives which were never very good, and which suffered greatly by the rough treatment they were subjected to during the march. It should be mentioned that these views are all reversed—*i.e.*, the right hand side of the picture should have been at the left side, and *vice versâ;* this was caused by the negatives having been varnished at the time they were done, which prevented the film being taken off and reversed.

The Plates of Birds are all by Keulemans, and with scarcely an exception they are all very accurately done.

Few who have not themselves attempted it can realize the difficulty of getting through the press a volume like the present, containing such a variety of information; notwithstanding all the care that has been taken some mistakes may have been overlooked.



CONTENTS.

PAGE

PREFACE vii

PART I.—NARRATIVE.

1. INTRODUCTORY 1
2. JAMU TO BANIHAL 13
3. KASHMIR 21
4. LADÁK 35
5. THE DESERT 66
6. HILL YÁRKAND. HEAD OF THE LOWER KARAKÁSH TO SÁNJU 86
7. SÁNJU TO YÁRKAND 108
8. ARRIVAL IN YÁRKAND, AND STAY IN THE CITY . . 122
9. RETURN JOURNEY 144

PART II.—NATURAL HISTORY.

CHAPTER I. ORNITHOLOGY.

1. RESUMÉ OF THE ORNITHOLOGICAL RESULTS OF THE EXPEDITION. BY A. O. HUME 153
2. DETAILED LIST OF THE BIRDS OBSERVED 170

CHAPTER II. INSECTS.

ORDER LEPIDOPTERA 305

CHAPTER III. BOTANY.

LIST OF PLANTS FOUND IN TIBET AND YÁRKAND . . . 308

PART III.—METEOROLOGY.

PAGE

METEOROLOGICAL TABLES 349

NOTES TO DR. HENDERSON'S METEOROLOGICAL OBSERVATIONS. BY R. STRACHAN 362

APPENDIX 367

LIST OF ILLUSTRATIONS.

PAGE

Map and Geological Sections 1

Heliotype Illustrations.

Ourselves at Yārkand . . . . . Frontispiece
Our Quarters in Yārkand Fort . . . . . ,,
Sind Valley above Gond 32
Sonamarg Bridge . . . . . ,,
Báltal 36
Rope Bridge above Drās . . . . . ,,
Drās River at Kirkichu 42
Paskyum . . . . . ,,
Valley above Paskyum 44
Image of Buddha carved in a rock 46
Tuktze, a Village near Karbu 48
Mané, near Lama Yuru . . . . . ,,
Ravine below Lama Yuru 50
Fort and Bridge over the Indus River at Kalsi . . . . ,,
Pencil Cedars at Hemis Shukpa 52
Gokra . . . . . ,,
Camp at Lukung, on the banks of Pángong Lake . . 58
Hot Springs above Gokra 72
Camp at Lak Zung, 18,000 feet above the sea . . . ,,
Camp at Lingzi Thang, 18,500 feet above the sea . . 76
Group of Kirghiz 92
Frontier Fort of Shálhidulla . . . . . ,,
Kirghiz Tent 102
Camp in a grove of walnut-trees at Kargallik . . . ,,
Camp at Shing Lung, on the Upper Karakásh River . . 146
Ice Bed on the Karakásh 150

Illustrations of Birds.

1. Falco Hendersoni 171
2. Picus scindianus 179
3. Lanius arenarius 183
4. Hemichelidon fuliginosa 184

PAGE
5. Alseonax latirostris 185
6. Hodgsonius phœnicuroides 187
7. Trochalopteron simile 193
8. Trochalopteron lineatum 195
9. Chatarrhœa caudata 197
10. Chatarrhœa Earlii 198
11. Oriolus kundoo 200
12. Pratincola ferrea 205
13. Saxicola Hendersoni 206
14. Ruticilla cœruleocephala 211
15. Ruticilla fuliginosa 212
16. Acrocephalus brunnescens 214
17. Fig. 1. Drymoipus inornatus 215
„ 2. Drymoipus longicaudatus . . . . . „
18. Suya albosuperciliaris 218
19. Phylloscopus viridanus 220
20. Fig. 1. Abrornis xanthoschistus 221
„ 2. Abrornis albosuperciliaris . . . . . „
21. Agrodroma Jerdoni 228
22. Podoces Hendersoni 244
23. Podoces humilis 247
24. Sturnus nitens 250
25. Passer cinnamomeus 252
26. Linota brevirostris 260
27. Melanocorypha torquata 265
28. Alauda triborhyncha 268
29. Alauda gulgula 269
30. Galerita magna 270
31. Palumbæna Eversmanni 271
32. Xema brunneicephala 300

Illustration of Insect.

Parnassius Acco (woodcut) 305

Illustrations of Plants.

Hololachne Shawiana 314
Iphonia radiata 324
Saussurea ovata 326
Apocynum Hendersoni 328
Deyeuxia anthoxanthoides 340
Algæ 343

PART I.

NARRATIVE.

MAP TO ILLUSTRATE THE ROUTE TAKEN BY THE YARKAND EXPEDITION IN 1870.

Route to Yarkand

Return Route

SECTION ALONG ROUTE

HORIZONTAL SCALE 1 Inch. about 70 miles (Geo.)

VERTICAL SCALE 1 Inch = 20,000 feet.

LAHORE TO YĀRKAND.

PART I.—NARRATIVE.

I. INTRODUCTORY.

WHILST stationed at Lahore on civil duty, in the end of April, 1870, I very unexpectedly received a note from Mr. Forsyth, Commissioner of the Jalandhar Division of the Panjáb, informing me that he was about to start at once for Yārkand, on a friendly visit to the Atalik Ghazi, and that he had applied to Lord Mayo for my services as medical officer to the expedition.

When I afterwards learned that our numbers were to be limited to three Europeans—namely, Mr. Forsyth, our leader, Mr. Shaw—who had made his hazardous journey to Yārkand two years before, and who was then in England—and last and least, myself, and that I should be expected to collect information of every imaginable sort, my first impulse was to decline the post, the more especially as I was only to be allowed a fortnight to complete my preparations. However, the chance of visiting a new and little explored country, under such favourable auspices, was much too tempting to be easily declined; and, with the alternative before me of a hot season in the plains

of the Panjáb, my qualms of conscience were easily overcome, and I at once set to work to get ready for the march.

People in England can have but a faint notion of the difficulties one has to encounter, in obtaining a proper outfit for such an expedition as ours; starting as we did, at short notice, from a remote Indian station. I lost, however, no time in writing for instruments, books, and so forth, although it was only after I had travelled several hundred miles that many of them overtook me.

I had some difficulty in deciding to what subjects I should limit my attention, in addition to my medical duties, which would not in all probability occupy much of my time.

Yārkand had seldom been visited by Europeans, and little was known regarding the country, beyond its geography, its climate, and the manners and customs of its inhabitants; its fauna and flora were quite unexplored.

In 1848 Dr. Thomson had examined the Botany of the country through which our route lay, as far as the crest of the Karakoram mountains, but he did not cross over into Yārkand territory.

In 1857 Schlagintweit was, I believe, the first European who travelled to Yārkand from India; he was murdered, however, shortly after his arrival by Wali Khan, who was then in power, and all his notes and specimens were lost to science.

Mr. Johnson, of the Indian Trigonometrical Survey, visited Khoten in 1865, and made a plane-table survey of the country through which he passed.

In 1868 Messrs. Shaw and Hayward visited Yārkand and Kashgár, and very fully explored the

geography of their route; collecting a vast amount of most interesting information regarding the climate, and the manners and customs of the people. Mr. Shaw brought back a few skins of animals, some of which were new to science; but no extensive collection of either animals or plants had ever been brought from Yārkand, nor in fact from beyond the Karakoram watershed. My friend Mr. Drew, geologist to H.H. the Maharajah of Kashmir, has, I believe, examined the geology of all the country up to the southern face of the Kuen Lun range, and it is to be hoped he will some day publish the result of his explorations.

Under these circumstances, it seemed to me that I could most usefully occupy my time, on the march, in investigating the botany of the regions we were about to traverse; as, however, the flora of Yārkand promised to be extremely scanty, I decided to divide my attention between the plants and animals.

I provided myself with instruments to observe the meteorology; but as these instruments had to be obtained in a great hurry, and I had to content myself with such as were most readily available, many of them were not well suited for carrying over a difficult country, and in consequence my losses by breakage were considerable.

I also took with me a small but complete photographic outfit, all in duplicate, and in case Mr. Shaw should not succeed in joining us, I took a few surveying instruments—a pocket sextant, prismatic compass, and nautical almanacs for 1870, 71, and 72. I thought it well to have several strings to my bow, and to be able to direct my attention to one or other branch of inquiry as opportunity should offer.

Mr. Forsyth's original intention was to go to Yārkand by Ladák, and return either by Gilgit to Kashmir, or *viâ* Badakshán and Cábul. It is much to be regretted that this intention could not be carried out, and that the European members of the expedition were so few in number; but as the object of Government in sending us was primarily a friendly visit to the ruler of Yārkand, and not to collect scientific information, and as a multitude of councillors is not usually an advantage on such an expedition, we had to submit to authority and make the best of it. As soon as the expedition was finally decided on, Mr. Forsyth sent off Faiz Baksh through Cábul and Badakshán to join us in Yārkand, and collect information regarding the road which might prove valuable, should we be in a position to return by that route. Faiz Baksh had been to these regions before; he was a good linguist, a very clever fellow, and a great adept at travelling in disguise, in proof of which I may mention, that although a resident of Lahore, he was for some time in our camp at Yārkand before our followers discovered who he was; one of our men then told me that he was a trader from Russia. Faiz Baksh had orders to throw off his disguise, and make himself known to the Yārkand authorities, the moment he entered their territory.

I may here say a few words about how the Expedition came to be sent; its nature, and the causes which led to it. In 1862, a valuable Report was published by Mr. R. H. Davies, then Secretary to the Panjáb Government, and now Lieutenant Governor of the Panjáb, on "The Trade and Resources of the

Countries on the North-western Frontier of British India." This Report showed that the trade between India and Eastern Turkistan—*i.e.*, Yārkand—by the Kashmir route, was virtually barred by the excessive duties levied on goods in transit. Negotiations were soon after entered into with the Kashmir Darbár, by Sir Robert Montgomery, then Lieutenant Governor of the Panjáb, which resulted in a very material reduction of the tariff on goods passing through the Kashmir territories; and the duties which were formerly taken at so much for each mule load, were afterwards to be assessed at an *ad valorem* rate, chargeable on the value stated in the invoice of the goods. This rate was subsequently fixed at five per cent.

In consequence of the stimulus thus given to trade, by the reduction of transit duty, attention was naturally directed to the various trade routes between India and Eastern Turkistan; and in 1867, Dr. Cayley was appointed by the Indian Government to reside during the summer months at Lé, whilst caravans were passing to and from Central Asia. The officer at Lé was instructed to see that no duties were levied in excess of those fixed in the tariff; to inquire closely into the nature and extent of the trade between India and Central Asia, and to suggest measures for developing this trade. Shortly after the arrival of Lord Mayo in India, matters seemed ripe for fresh negotiations with the Maharajah of Kashmir, in order to free the trade entirely from the duties which still checked it, and to open up and explore the route by the Chang Chenmo valley, which was believed to present fewer physical difficulties than the other route by the Karakoram. In 1869, I saw men at Lé who had

crossed over from Yārkand by this route in the depths of winter; they described the road as almost free from snow, and practicable for laden horses the whole way, at all seasons; in this, it contrasts strongly with the old Karakoram route, which is quite impassable for half the year.

In October, 1869, the Panjáb Government were directed to enter into negotiations with the Maharajah, and to obtain permission from His Highness for British officers to survey and mark out the various trade routes leading from the British frontier; to induce the Kashmir Darbár to abandon their duties on the through traffic; to assist the means of transport on the route which should be selected as the most suitable; and to appoint a special officer, who, in conjunction with a Commissioner to be appointed by the British Government, should superintend the route, and see that all regulations for the safety and development of trade were fully enforced.

These negotiations resulted in a treaty between the British Government and the Maharajah of Kashmir, which was ratified by Lord Mayo, at Syálkot, on the 2nd May, 1870.

As already mentioned, Messrs. Shaw and Hayward went over to Yārkand in 1868—the former to trade, and the latter, under the auspices of the Royal Geographical Society, to explore the Pámír Steppes.

It was, doubtless, owing to the good impression made by these gentlemen, that the Atalik Ghazi, soon after their departure from Yārkand, in 1869, sent an envoy to the Viceroy of India in the person of Mírza Shádi, who had just returned from St. Petersburg very shortly before he was ordered to start for India.

Mírza Shádi arrived in Lahore at the end of 1869, and after a halt of some weeks went on to Calcutta, where he had an interview with Lord Mayo. Amongst other things, he requested, on behalf of his master, that a British officer should be sent back with him on a friendly visit to the Court of the Atalik Ghazi, as a proof that our Government wished to be on friendly terms with that of Yārkand. Lord Mayo determined to comply with this request, and in selecting an officer the choice naturally fell on Mr. T. D. Forsyth, C.B., Commissioner of the Jalandhar Division, who for many years had devoted much attention to Central Asian matters.

The visit to Yārkand was to be merely a friendly visit to the Atalik Ghazi. It was to be regarded in no sense as a mission, and to have no political objects.

Mr. Forsyth was instructed to abstain from taking any part in the political questions that might be agitated, or disputes that might arise, beyond advising the Atalik Ghazi that he would best consult the interests of his kingdom by a watchful, just, and vigorous Government; by strengthening the defences of his frontier, and above all by abstaining from interference in the political affairs of other states, or from mixing in the quarrels of chiefs or tribes which did not directly concern his own interests. Mr. Forsyth was to endeavour to obtain the fullest information possible regarding the prospects of trade; the Indian staples that were most in demand; the resources of Yārkand and neighbouring countries, their past and present history, and generally any information which might be considered of interest.

Whilst Mírza Shádi halted in Lahore before going

to Calcutta, it happened that I saw a good deal of him; one day he chanced to pay me a visit when I was having some photographs taken, and I tried to get him to sit for his portrait. He objected to this as being contrary to the Koran, but he hinted that a friend of his who was present, and who did not know what photography was, might be got to sit, and accordingly his friend had a likeness taken without his ever suspecting what was being done. Next day he at once recognised the print of himself, and only then discovered why we had been making merry at his expense on the previous day. As soon as I learned that I was to go to Yārkand, I asked Mírza Shádi if I should be allowed to photograph in that country. He advised me to take the apparatus with me, but said I had better not ask leave, but do it as a matter of course.

On the 12th May, whilst my arrangements were still incomplete, I had to hurry off to attend to an urgent case of sickness in the camp of Mr. Forsyth, who had preceded me, and was then forty-five miles beyond the Kashmir frontier.

I left Lahore in the evening by "Dák" carriage, and travelling all night to avoid the heat reached Wazírabád, on the banks of the Chenáb at 10 A.M. next morning; after being delayed several hours on the road by bad horses. When I arrived, the thermometer in my carriage was at 95° F., and as it was much too hot to go on during the day, I made a halt, and at night went on to Syálkot, thirty miles distant. I reached Syálkot before the sun was up, and finding a carriage and pair of mules belonging to the Maharajah waiting for me, I at once went on to

Jamu, twenty-five miles to the north-east. The road from Syálkot to Jamu is for the most part merely a track through fields, without any regularly made road. We travelled, however, at a rattling pace the whole way, until near Jamu, when the road became alarmingly bad, and after having several narrow escapes of being upset, we were at last brought to a stand-still by going over a vertical drop of about two feet, which nearly pitched us all out of the carriage and broke the pole; but the coachman, who seemed to take this as a matter of course, quietly proceeded to a neighbouring bush, and producing some ropes and spare poles which were there kept concealed, set to work to fit in a new pole. It appeared that accidents were of frequent occurrence at this part of the route, and instead of mending the road, which to European notions would have seemed the proper course, the Oriental mind preferred the other alternative.

Near the foot of the hills here, as elsewhere along the Himalayas, there is a strip of dense jungle; at Jamu it is only about two miles wide, and consists chiefly of *Acacias*, *Zizyphus*, *Justicia*, &c. It is carefully preserved by the Maharajah of Kashmir as a shooting ground, and is said literally to swarm with wild pig. On one occasion, some years ago, when stationed at Syálkot, a number of us were invited to Jamu to have some pig shooting in this jungle. A very good bag was made, but at the end of the day some doubts arose as to whether we had not been shooting domesticated porkers, for one of the pigs when shot was said to have had a rope about its neck.

Jamu, the winter residence of the Maharajah of

Kashmir, is a considerable town situated on the first range of low hills which bound the Panjáb plains, twenty-five miles to the north-east of the large military station of Syálkot. The town overlooks the Tovi, a tributary of the Chenáb; it is very crowded, and very irregularly built on a hill which slopes towards the south-west, and the streets are most of them steep, and all dirty.

The palace at the northern and higher end of the town is a rather imposing structure; placed on the very brink of a precipice which rises vertically from the stream below, and its appearance from a short distance is rather picturesque.

Water, for the supply of the palace and part of the town, is said to be raised from the stream by steam power and distributed in pipes, an example which will probably soon be imitated in our Panjáb towns. The Maharajah is fond of mechanics, and has several European engineers in his employ.

My intention was to start in the evening to join Mr. Forsyth, who, as already mentioned, was encamped forty-five miles distant; but as it seemed the correct thing to call on the Maharajah, I intimated my wish to do so to the official, who according to custom came to ask after my welfare—*mizáj pursi* as it is called—and said I would call at any hour which was most convenient for His Highness. In the evening an official came to inform me that, if quite convenient for me, the Maharajah would be delighted to see me at 8 A.M. next morning, and that an elephant would be sent to convey me to the palace.

Next morning accordingly I went. The visit was a rather ceremonious one, and the conversation

was chiefly confined to asking after each other's welfare.

In answer to his request that I should inform him of any discoveries I might make in his territory, I promised to do so; but I politely hinted that I had already discovered one thing, namely the want of good roads. He did not seem to like this much, and so, after wishing me a safe journey, the interview terminated.

The last thing an Oriental ruler thinks of undertaking is roads, and it is certainly very remarkable how trade finds a passage for itself, and actually forms a road over a difficult hilly country; much as a stream makes its way to the sea, and almost as little affected by physical obstacles, or political revolutions.

During the Indian Mutiny I am told that camel loads of grapes were brought as usual from Cábul, and offered for sale in the British camps before Lucknow, and the owners, when refused the exorbitant prices demanded for their goods, turned their steps towards the besieged cities.

The route from Jamu to Yārkand may be divided, for convenience, into six very distinct portions.

1st. From Jamu to the Kashmir Valley, nine days journey, about 106 miles.

2nd. From the top of the Banihál Pass, on the south side of the Kashmir Valley, through the vale of Kashmir; and up the Sind Valley to the Zoji-lá Pass, nine days journey, about 144 miles, fifty of which may be accomplished by boat—viz., from Islámabád to Srínagar, and thence to the mouth of the Sind Valley.

3rd. From the Zoji-lá Pass, through Ladák, to

Chágra, one march beyond the Pángong Lake, where cultivation ceases, twenty days' journey, about 281 miles. I call all this Ladák, including under that name the Drás Valley.

4th. From Chágra to where the lower Karakásh Valley was entered, just beyond the Salt Plain, eleven days' journey, 185 miles, through a desert the whole way, at an altitude varying from 15,000 to 19,600 feet above the sea.

5th. Along the lower Karakásh Valley—Sárikía as the Kirghiz term it—and over the Grim or Sánju Pass to Sánju, fourteen days journey, 180 miles. This part of our route may be called Hill Yārkand.

6th. From Sánju to the City of Yārkand, six days' journey, the first three of them over a desert plain, with oases at the halting-places along the streams which come down from the hills, 116 miles. This part of the road I call the Yārkand Plains.

The total distance from Jamu to Yārkand being about 1012 miles—rather roughly estimated—by the road taken by the Expedition; about sixty-nine days marching, exclusive of halts.

The traders who annually visit Yārkand, go one season and return the next; and although there are only 69 marches, it is quite impossible to get over the ground with laden animals in anything like sixty-nine days, unless one had constant changes of baggage animals. Traders, on arrival at Lé, always consider it necessary to give their horses at least a fortnight's rest, before they are again fit to take the road; and they make frequent halts wherever grass is to be got.

II. JAMU TO BANIHAL.

I left Jamu on the evening of the 15th May, and, being in excellent training, I decided to go on at one stretch three fifteen-mile marches to Mír, where Mr. Forsyth was encamped. At starting, my thermometer, which had been in the shade of a verandah, stood at 92° F. My own horses had not come up, although they had left Lahore before me; so I borrowed a pony, intending to ride, but after proceeding a few miles on foot, the road did not improve, and I could not ride with any comfort in the dark, I therefore sent the pony back, and determined to walk the whole way. Here I may remark, that in dry weather I find sandals by far the most comfortable to walk in, over bad ground, and next to them light boots, which have been worn until they fit the feet perfectly; they should fasten with four or five straps and buckles, one or more of which can be loosened when necessary.

From Jamu my road lay in a northerly direction, first down a very steep descent, then for a few miles along the bed of the stream which flows under the Palace at Jamu. I then crossed a succession of soft sandstone ridges, on which the footpaths were deeply worn into the rock; and fifteen miles of very difficult walking brought me to Dausál, the first regular halting-place. I may here note that along all frequented roads in the East, there are regular halting-places at the end of every ten to fifteen miles. Sometimes there is a caravanserai, or more frequently there is merely a shop where supplies can be had. Natives, when travelling, usually depend entirely on these shops for their food, which is purchased every

day, and in the case of Hindus is cooked by each man for himself, or by one man for all the others of his own caste. This route to Kashmir, although physically one of the easiest, is practically about the worst, from the absence in many places of any attempt at making a road.

At Dansál, I intimated to the men who were with me that I proposed to go on to Mír, but they all seemed to have had enough of it for one day, so giving them the option of coming on by regular marches, which they all accepted, I lay down and had an hour or two of sleep, until a guide could be procured to show me the way.

I again started before daylight, and as day began to break I found myself in an open, well-cultivated valley, near a village called Ugerbai; the hills on either side were covered with scrubby jungle, and the country very much resembled the Salt range below Jhelum, and had a very parched appearance; in fact, the climate for thirty miles into the low hills differs very slightly from that of the Panjáb plains.

The European Cuckoo was calling in every valley, and reminded me of home, for during eleven years on the plains I had never seen it or heard its call, although another species of cuckoo is common enough about Lahore.

At Krimchi, fifteen miles from Dansál, there is a halting-place near the village, and there I found one of Mr. Forsyth's servants preparing breakfast for me under a tree. On the way to Krimchi I noticed, growing wild, the five-angled Euphorbia, *E. pentagona*, so often used as a hedge plant in the Panjáb, where it goes by the name of Cactus. From its

habit it seems as if it had been specially designed for making hedges; but I believe there was formerly prevalent a notion that it was prejudicial to health, and it was objected to in military cantonments; as it grows to more than four feet in height, perhaps it would come under the designation of "rank vegetation." The "Kameyla" (*Rottlera tinctoria*) was one of the most common trees, also the Pipal and Banyan, and another species of fig called "Trimmal" by the people, which has the fruit growing on the main stems. All the trees, both indigenous and cultivated, of the plains, extend thus far into the hills, and many of those cultivated on the plains, such as the Pomegranate, are found here wild. The Walnut and Plane were seen, but always of small size, and evidently introduced from Kashmir, where both are cultivated, but apparently not indigenous.

The mass of the jungle on the hills is composed of "Phulai" (*Acacia modesta*) which is also indigenous on the plains; "Vehiker" (*Justicia adhatoda*) which extends for twenty miles into the plains, and *Dodonæa*, which is much cultivated as a hedge plant in the Panjáb under the name of Bog Myrtle, from some supposed resemblance to the Sweet Gale of English marshes. In Agra I found that the *Dodonæa* was called Australian Box.

A species of *Rhus* was common; this yields a very beautiful timber called Zebra Wood, which is much used about hill stations for carving. I also saw a *Celtis*, a Barberry, "Curounda" (*Carissa Carundas*), and a species of wild pear.

Leaving Krimchi at 9 A.M., I walked fifteen miles to Mír, where I found Mr. Forsyth; the first two-

thirds of the way was up a steep hill, and the remaining third nearly level. I had now reached the region of Oaks, of which two species were noticed. It is remarkable that although Oaks are very common south of the Kashmir Valley, they do not extend into Kashmir; the same is the case with the Rhododendrons, which latter however are very rare here.

Most of the trees now had a "Lombardy poplar" look, owing to the smaller branches being lopped for fodder in winter; throughout Kashmir and Tibet most of the trees are lopped in this way, and sometimes they are completely pollarded.

On the 16th May, at Mír, 6 P.M., my mercurial barometer stood at 25·1, the attached thermometer 83° F., and water boiled at 203·1° F.; the altitude is therefore about 5000 feet; notwithstanding the elevation, however, the sun during the day was still very unpleasantly hot.

We halted at Mír on the 17th May, and next day marched twelve miles to Lándré, halting during the heat of the day at a place called Jalún, under some shady trees at the bottom of a ravine. As far as Jalún the road descends, it then ascends through a grove of Oak and Olive trees, and a few Pine trees (*Pinus longifolia*) now begin to appear. On this march I first noticed the Lammergeyer (*Gypœtus barbatus*) which was seen almost every day after this, up to 15,000 feet, until we emerged from the hills on to the plains of Yārkand. At Lándré, whilst the horses were being taken to water, a valuable animal belonging to one of our followers fell over a precipice and was killed.

On the 19th May we started at early dawn for Luru Lári, which is on the top of a Pine-clad ridge; the

road ascends for eight miles, the first half being through rich cultivation, and afterwards through Pine forest. Luru Lári is about 8600 feet above the sea; we had ascended in eight miles 3600 feet, and were now on the very top of the ridge, which is beautifully wooded. We halted here till the afternoon, and then went on seven miles to Balot, the regular halting-place, where there is a rest-house which overlooks the valley of the Chenáb river.

Balot is about 2500 feet above the sea, and about 500 feet above the river Chenáb, which we crossed next day by a rickety wooden bridge, marching nine miles to Rám Ban, where there is a very comfortable rest-house on the banks of the river, and some gardens kept up by the Maharajah. Here we changed our porters and baggage animals. The valley of the Chenáb is here very beautiful, being well wooded; most of the cultivated trees of the Panjáb are here indigenous, and the tops of the hills are covered with Pine trees.

Next day we marched up a very steep hill for six miles, and for four miles more along a shady ravine to Rám Su, where we halted the following day to allow the servants and baggage to overtake us.

Up to this point very little animal life was visible in the woods. I had seen no mammals, and almost no birds that are not common in the plains. At Rám Su the "Black Bulbul," the "Yellow-billed whistling thrush," and the "Yellow-billed blue Magpie," were common, as well as several others. The crow of the plains, *Corvus splendens*, had been replaced by the Black Hill crow *Corvus intermedius*, and soon after this we saw the Jackdaw. At Rám Su my

servants and baggage, which had started from Lahore before me, and which I had passed on the road, began to turn up, and my men were loud in their complaints about the difficulty of the road. Here my sun thermometer rose in the afternoon, when placed in the sun, to 194° F.; this may seem almost incredible, but in Tibet, at a much higher altitude, when the temperature falls at night below zero, Dr. Cayley has found the sun thermometer rise above 200° F. at midday.

This extraordinary heat of the sun's rays is no doubt owing to the extraordinary clearness, as well as rarity, of the atmosphere in these elevated regions.

On the 23rd May we marched fifteen miles, from Rám Su to Banihál, a village at the foot of the pass of the same name. There is a great deal of rice cultivation here, and all the hills are covered with grass, but there is not much forest, except along the streams. Walnut-trees planted about the villages attain a large size, and most of them have the mistletoe growing on them. Here I first noticed the beautiful Pheasant-Tailed Jacana, *Hydrophasianus Sinensis*, which was very common in the flooded rice-fields. I sent a man to shoot some specimens, but on his return with half a dozen birds I found that, being a Mahomedan, he had thought it necessary to cut all their throats to make them "*halál*," and he had not only thus disfigured the skins, but had also pulled out most of the long wing and tail feathers, and thus rendered the specimens utterly useless. This was the sort of man I had to break in for my work. On May 24th, for the first time since we had started, the sky was overcast and a thunderstorm was threatening

to break on the Pass. We therefore waited until nine a.m., when, as the weather did not seem inclined to show its intentions, we resolved to cross and risk a drenching. The top of the Pass is about eight miles from Banihál; the ascent is very steep for the last two-thirds of the way, and almost devoid of trees; but there is an extraordinary profusion of wild flowers, and I made such a collection that two men were required to carry them. But all these specimens got destroyed by the damp within the next few days, and had to be thrown away. Near the top of the Pass I was met by a Fakir, who brought me, as a present, a large bunch of the beautiful yellow Fumatory (*Corydalis*). In many parts of the Himalayas the people are very fond of wild flowers—although they never attempt to cultivate flowers—and they have a custom, which I always like to see, of decking their head-dresses with those they pick up along the road. On the top of the Pass there is a beautiful carpet of short green sward, and a great deal of dwarf willow jungle. As on most passes, there is a small lake, or rather tank, at the very highest point. I do not know how it happens that almost every pass I have crossed has a small lake or tarn near the top. Probably many of them have been artificially made by traders to retain the rainfall. On most passes one or more Fakirs usually have their abode, and the tanks may have been made by them. It is, however, the case that two-thirds of the passes I have crossed have this small lake or tarn near the summit, and often in the most unlikely places for a lake to be found. Some of them have no doubt been formed by glacier action.

On the Pass itself there was no snow, but I saw a large mass in a ravine to the right under shelter of a steep cliff. This is one of the easiest passes leading into Kashmir, and is said to be crossed at all seasons without difficulty from snow.

The country between Jamu and Kashmir being south of the snowy range, is under the full influence of the periodical rains which fall in July, August, and September. At other seasons as far as Mír it appears to be almost as hot and dry as the Punjab plains, judging from the scanty vegetation on the low hills.

Beyond Mír the climate becomes much more moist and temperate as the snowy range is approached, and for forty miles south of the Pass the hills are covered with verdure, and the valleys and some of the mountain sides are laid out in terraced rice-fields; along the valleys there are groves of alders, which often grow to a very large size.

With the exception of the Chicore partridge, game is scarce, and large game is almost never seen either here or in any other part of these hills, except at a great distance from human habitations, and by those who go especially in search of it. This route to Kashmir is not open to European travellers without special permission from the Maharajah, as the road is not kept in the same repair as some of the others; there are no arrangements at the halting-places for the supply of porters, baggage-animals, and provisions; and without special arrangements the passage through the country of even a single European traveller is apt at times to cause very great inconvenience to the people.

III. KASHMIR.

From the summit of the Banihál Pass, which is about 9000 feet above the sea, we saw below us the Eastern part of the far-famed valley of Kashmir, the first view of which at this season is rather disappointing, for the whole valley is nothing more nor less than a vast swamp of rice-fields, and the steam rising from the flooded plain limited our view to the neighbourhood of Vernág, where our next camp was to be, about eight miles distant, and nearly 4000 feet below us.

We had, however, a tolerably good view of the snowy ranges on the northern side of the valley, and between us and Vernág there was a dense and very varied forest, consisting chiefly of deciduous trees, covering the northern slope of the pass from summit to base. Before reaching Vernág, at four p.m., we were overtaken by the thunderstorm which had been threatening all day; this storm lasted throughout the night, and rain fell in torrents. Most of our baggage was thoroughly wetted, and we had to halt next day to dry our tents. Next evening we had a repetition of the thunderstorm, which continued all night as before; and we had to wait until the afternoon of the following day before we could proceed to Achibal, twelve miles distant.

At Vernág there are several rest-houses, with tolerably good accommodation. They are built close to a famous tank of very clear blue water. This tank is built round with masonry, and is eighteen feet deep. An immense stream issues from it, and forms one of the many sources of the Jhelum river, called here the

Behát. Like all tanks in Kashmir, it swarms with fish, which are considered sacred by the Hindus, and are so tame and fearless that they readily take food from the hand. On the afternoon of the 26th May we marched to Achibal; the sky was clear on starting, but we had proceeded only a few miles when clouds began to gather overhead, and before we reached Achibal we were drenched with rain. As there was no rest-house, our tents had to be pitched on ground which was an inch deep under water. When marching in the Himalayas—and perhaps elsewhere the same may hold good—it is well to make a point of starting very early in the morning, as the weather is then usually fine, and when rain means to come on it generally falls in the afternoon. Camp life in wet weather is unpleasant enough, even when the tents are pitched on dry ground, but when one has to encamp in a six-feet-square tent on ground which is already under water, and all one's effects are damp and clammy, life in a tent is about as unpleasant a position as can well be imagined.

At Achibal there is an old garden, with fountains supplied by one of the largest springs in Kashmir. The water issues like a river from a large cleft in a rock immediately behind the garden, and forms another source of the river Jhelum. At Vernág and Achibal the mistletoe—identical with the English species—was common on the Walnut-trees, which are very abundant here and throughout Kashmir, but always cultivated; the fruit forms a very important article of food with the people, and a large quantity of oil is expressed from the nuts.

One of the most striking birds I met with here

was the Paradise fly-catcher, which is not uncommon in the Panjáb. Some of the specimens I shot had the long tail feathers partly white and partly chestnut coloured. The birds were breeding, and I obtained several nests with eggs.

On May 27th we left Achibal early in the morning for Islámabád, six miles distant, where boats were waiting to convey us down the river Jhelum to Srínagar, the capital of Kashmir. I made a detour of five miles to Martand, and obtained some fair photographs of the old temple, which is one of the finest ruins in the country. We embarked in our boats at Islámabád in the afternoon, and next morning reached Srínagar, about fifty miles distant, by water. Again the weather was unfavourable, for it rained incessantly the whole night.

The journey by boat down the Jhelum is one of the most pleasant trips I know of, when the weather is fine, as it usually is in Kashmir; and travelling by boat is all the more relished after some days or weeks of difficult marching over the hills. The Jhelum river abounds with fish, but it is only at certain spots, such as under the bridges or wherever there is an eddy, that good rod fishing is to be had. The boatmen, however, are very expert at catching fish with a large hand net, under the boats which are moored along the banks, and in this way the kitchen is usually well supplied.

The Kashmir boats used for long journeys are exceedingly comfortable. Each boat is about five feet wide in the centre, by forty to sixty feet long, and tapers to a point at either end. The boatmen occupy the bow and stern, where they have arrange-

ments for cooking their food; and the centre part is occupied by the passenger, who has plenty of room for his bed, chairs, and table; an awning of grass matting, extending over the whole length of the boat, makes one as snug as possible. In these large boats the paddles, shaped very much like the spades on playing-cards, with handles about three feet long, are seldom used; going down stream the boat moves with the current, and up stream two of the boatmen walk along the bank and drag the boat by a tow line. The servants and heavy baggage follow in a larger boat, some little distance behind, and the two boats only come together when breakfast or dinner is ready. It is quite surprising how well native servants manage to cook in camp. I have seen a first-rate dinner put on the table in camp, when the whole country was a puddle and rain falling in torrents; and on inspecting the kitchen I found that the "joint" had been roasted on a skewer, supported between two tent pegs, and protected from the wind and rain by an umbrella stuck in the ground. On board the servants' boat there is usually a very elaborate kitchen range, constructed of dried clay.

On the way down the river we passed the very interesting ruins at Avantipore and Pandrattan, where I took some photographs, and in the forenoon we reached Srínagar. Near the city I saw a large snake take to the water and swim across the river, holding its head about six inches above the surface.

My photographic outfit consisted of two stereoscopic cameras, suitable for doing stereo pictures, or one picture $4\frac{1}{2} \times 7\frac{1}{4}$. One of the cameras, with a small dark tent, and a stock of chemicals sufficient for three

or four days use, were carried by one porter, with a second man to carry my mercurial barometer and to relieve the first on steep roads, and thus enable me to keep my apparatus along with me during the march. One of my own servants, who always accompanied me with a large botanical case to take charge of the plants I collected, had been instructed in unpacking and arranging my dark tent and chemicals, and whenever I wanted to take a picture this man got everything ready, whilst I selected the point of view and arranged the camera. The time occupied in halting to take a photograph was seldom over an hour, and twenty minutes more were required to do a second one. The great difficulty of working on the march is that one's chemicals sometimes get out of order, and the nitrate bath persistently refuses to work. To avoid this the best way is to have three baths, one in use, and two in reserve, and to use one until it gets out of order; it should then be replaced by one of the others until a halt is made, when it may either be remedied or thrown away, and a fresh one compounded. Above 15,000 feet I found it very difficult to work, as the collodion often boiled the moment the stopper was removed from the bottle; at other times the water used for washing the plate would freeze and destroy the picture.

At Srínagar — altitude 5200 feet — we found it necessary to halt for several days to complete our outfit: our tents had all to be lined with woollen cloth. These tents were each about six feet wide, by six to ten feet long, and some of them had an awning in front which could be let down to keep off the wind. Our servants had all to be provided with

warm clothing suitable for the arctic climate we might expect soon to experience. I occupied myself in training my collectors.

The Yārkand envoy, whom we had left at Lahore, was to have overtaken us at Lé, but as nothing had been heard of his movements since we left Jamu, and we could not depend on him following us up within a reasonable time, it was necessary to wait until he was fairly started.

We were here joined by Mír Akbar Ali Khan Bahádur, C.S.I., who had distinguished himself in the Abyssinian campaign. He came with us as native secretary to Mr. Forsyth, and as time was pressing, and no tidings of the envoy's progress reached us, Mr. Forsyth sent his secretary, the Mír Sahib, to hasten Mirza Shádi's movements. During our halt at Srínagar I met Mr. Hayward, who was on the point of starting for the Pámír *viâ* Yásín, where he was barbarously murdered a few weeks later. I had, as I have said, provided myself with the necessary instruments for making a route map and taking latitudes in the event of Mr. Shaw not joining us at Lé, and Mr. Hayward most kindly gave me the benefit of his great experience in this kind of work. Night after night we lay out on the grass until the small hours of the morning, taking the latitude from different stars, and this practice I continued every night until we arrived at Lé, where Mr. Shaw joined us, when I resigned the geographical work into his hands, as he had come prepared to undertake it.

Hayward was the most indefatigable geographer I ever met. His zeal for exploring was unbounded, and he was so intensely interested in the work in

which he was engaged, that it was impossible to come much in contact with him without being infected with his love of exploration.

He was a little indiscreet in fully divulging all his plans, and had he been less courageous and impetuous he might possibly have eluded the plots laid to compass his end. He was quite aware of the great risk he was running, but started with a light heart; determined to effect the object he had undertaken or perish in the attempt.

Whilst we were in Srínagar the temperature varied from as low as 50° F. during the night to a maximum of 80° F. in the shade during the day. We had slight thunderstorms every other day, which cooled the air and prevented the heat during the day becoming oppressive, as it often is at this season in Kashmir. About this time some vague rumours reached us from India, having come probably *viá* Cábul, that there were disturbances in Yārkand, and as Mr. Forsyth had peremptory orders to return at once if he should find that absolute peace did not exist in the Atalik Ghazi's dominions, it was necessary to take steps to discover whether or not there was any truth in these rumours.

With this view Ibrahím Khan, a deputy inspector in the Panjáb police force, who accompanied us, and who had great knowledge of the frontier tribes, being a frontier man himself, was sent off with two of his men by the short route *viá* Gilgit, to make his way to Yārkand, and meet us before we entered Yārkand territory. Tára Singh, a very enterprising Síkh trader, who had returned the previous year from Yārkand, volunteered along with his brother to go to

the Yārkand frontier by the route we proposed to take. They were afterwards joined at Lé by Hari Chand, a son of the headman, or Negi, of Lahul. They were to obtain information, from any men they might meet on the road, regarding the state of affairs in Yārkand.

All these men travelled in very light marching order, and where practicable were to make double marches. Ibrahím Khan and his men joined us in Yārkand, and Tára Singh and his party, after going to Sháhidulla, a frontier fort in Yārkand territory, and ascertaining, as they believed, that there was no ground for the rumours of disturbances, returned and found us at Lak Zung, four days march before we struck the Karakásh river.

On the 13th June we learned that the Yārkand envoy was near the Banihál pass, and as the Mír Sahib was with him, and not likely to let him loiter on the way, we resolved to make a fresh start. I went by boat as far as Gánderbal, at the entrance to the Sind Valley, as I wished to get some shooting on the river, but a thunderstorm came on soon after I started, and although the distance by land is only twelve miles, and by water not above twenty, I did not reach Gánderbal until next day about noon.

On leaving Srínagar I had the following men under my orders: Mahomed Yásín, a native doctor, from the Pesháwar frontier, a very sharp little fellow, who was fond of dressing himself out in the wildest attire; he carried a huge cavalry sword nearly as long as himself, and when mounted on his wiry little pony, and with his military accoutrements, looked for all the world like some small frontier chieftain; he

always went by the name of "Natoo" amongst our followers, a contraction for native doctor, in contra-distinction to the head bird-stuffer, who was called the Chirya (bird) Doctor, or usually "Chirya." Natoo had a friend with him, who was not on the establishment. This was a young man, a relation of Natoo's, who had a great desire to see foreign parts, and was being instructed by Natoo in the rudiments of medical science, with a view to become a pupil at the Lahore Medical College. Natoo had a wonderful turn for acquiring languages. He, of course, knew Hindustani and Pushtoo; he also spoke Persian fluently, and having lived in Peshāwar, near the Kashmiri's quarter, he had picked up enough Kashmiri to converse freely in that language. Whilst we travelled through Ladák he managed to learn some Tibetan, and before we had been a fortnight in Yārkand he was able to question the sick in Turki regarding their symptoms, and give them directions for treatment.

Abdulla, my chief bird-stuffer, was kindly sent to me by Dr. Anderson, Curator of the Calcutta Museum. Although a Bengali, and unaccustomed to a very cold climate, he worked remarkably well. When his work began to get behind, he used to start at day-break with the arrears of birds to be stuffed, and galloping on to next camp, would there work, sometimes till midnight, preparing the skins.

I also employed two Kashmiri Shikaris to shoot and preserve birds; but one of them, a tailor by trade, was so awkward in handling a gun, that the very first day he managed to shoot and slightly wound one of the boatmen, and soon after he fell with one of my

rifles and broke it right in two; so, to prevent further damage, we employed him ever afterwards as tailor to the camp, and found him very useful. I had two men to accompany me on the march and take charge of all the plants I collected, and dry and press them when we reached camp. One of these men was named Umer Dín; he was a Kashmiri by birth, but had long been resident in the Panjáb; he talked Kashmiri and Persian fluently—all men of education in India, and throughout the East, know Persian. My other man, Golám Ali, was by trade a gardener, and had accompanied me on several previous excursions into the hills; he not only assisted in collecting and drying plants, but took charge of my photographic apparatus. My private servants were five in number.

At Srínagar we were joined by two remarkable men, and as Mr. Forsyth saw more of them than I did at the time of their joining us, I quote his remarks.

"One of these men was destined to take an important part in our future proceedings in Yārkand. Kázi Syad Mahomed Yakub, nephew of the Atalik Ghazi, went some years ago from Kokand to Constantinople, to lay the state of affairs in his native country before the Head of the Faithful.

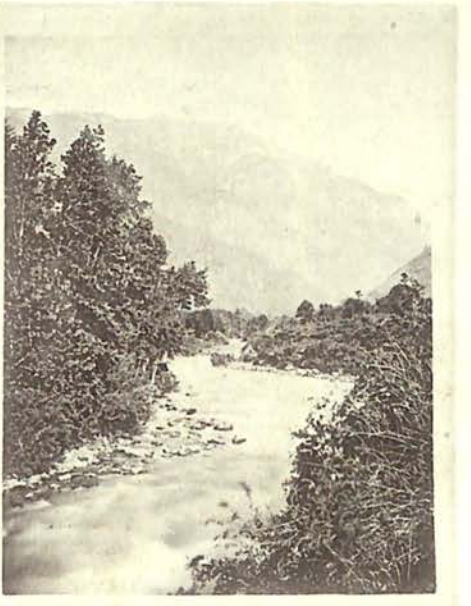
"But on arriving at Constantinople, he heard that his country was disturbed, and he resolved to remain quietly there for about four years, and then, having heard of the success of his uncle in Eastern Turkistan, took the route of India and Kashmir to join his fortunes to those of Yakoob Beg, in Kashgár. Mahomed Yakub, being a Syad, and having performed the pilgrimage to Mecca, had of course a high reputation for sanctity, and being otherwise a man of character,

had acquired great respect from all good Mahomedans. I found him at Srínagar, the guest of the Maharajah, as he had been a guest of the British Government, and lodged in the house of one Khwája Gafur Sháh Naksh-bandi, a person of note in Kashmir. Mahomed Yakub, besides considering himself a very holy man, prided himself on being an accomplished author; and as we sat down together on a carpet, under some wide-spreading plane-trees, to escape a shower of rain, he ordered his servants to produce two well-bound and neatly written volumes which he said he had composed whilst halting at Srínagar. In his train was an Arab priest, who had come from Medina on a visit to Yārkand. This man, named Kalíl, could scarcely speak a word of Persian, and knew nothing of any language current in Hindustan, yet had made his way by steamer up the Indus, and, by way of Lahore, to Srínagar, where he placed himself under the charge of Kázi Mahomed Yakub. From his companions I learned that this Arab had been attracted to Kashgár by the fame of the Atalik's liberality to all good Mahomedans, that ruler having made himself known at Mecca by establishing and endowing a caravanserai there. Kalíl, in the hope of obtaining a good sum of money, and possibly the endowment of a school at Medina, had brought some wonderful specimens of Arab books, Korans, &c."

At Gánderbal we encamped under some enormous Plane-trees; the largest of these had a girth of twenty-nine feet, at four feet from the ground, and the two next largest were each twenty feet in girth. The *Platanus orientalis* is one of the most common and handsome trees in Kashmir, but is not indigenous there, for it is said

never to ripen its seed, and to be always multiplied by cuttings. In the course of the day we were joined by a party of travellers, also bound for the Sind Valley, and we heard that several other friends had preceded us. Again the weather was unpropitious, for rain came on in the afternoon and continued all night.

Next day, June 15th, we marched up the Sind Valley to the village of Kangan, twelve miles distant, crossing the Sind river by a wooden bridge within three miles of the new camp. At Kangan, the Mír Sahib joined us, and brought word that the Yárkand envoy was close behind; so we resolved to halt on the 16th in hopes of his joining us. On the 17th June, we marched to Kulán, fourteen miles. On this march and the preceding we passed through some of the finest scenery in Kashmir; the path is close to the Sind river the whole way, and through groves of Walnut, Elm, and Horse-chestnut. Near Kangan I measured some fine Elm-trees, and found the three largest twenty-nine feet in girth, at four feet from the ground. Hawthorn, identical with the English species, but with larger fruit, was common. We passed many small Swiss-looking villages, half hidden by orchards of apple, pear, and apricot trees; the mountains on either side of the valley, particularly on their northern and western aspects, are clothed with dense pine forests; and above these, in the upper part of the valley, snowy peaks and glaciers complete the picture. On the first two marches above Gánderbal, there was a good deal of cultivation, chiefly rice; but on the next two — viz., to Sonamarg and Báltal, twelve miles each—cultivation almost ceases, with the exception of an occasional field of buckwheat; the scenery,



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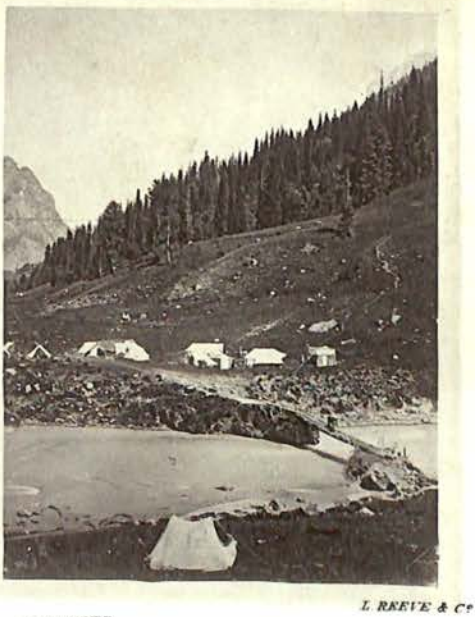
SIND VALLEY ABOVE GOND.

P. 32.



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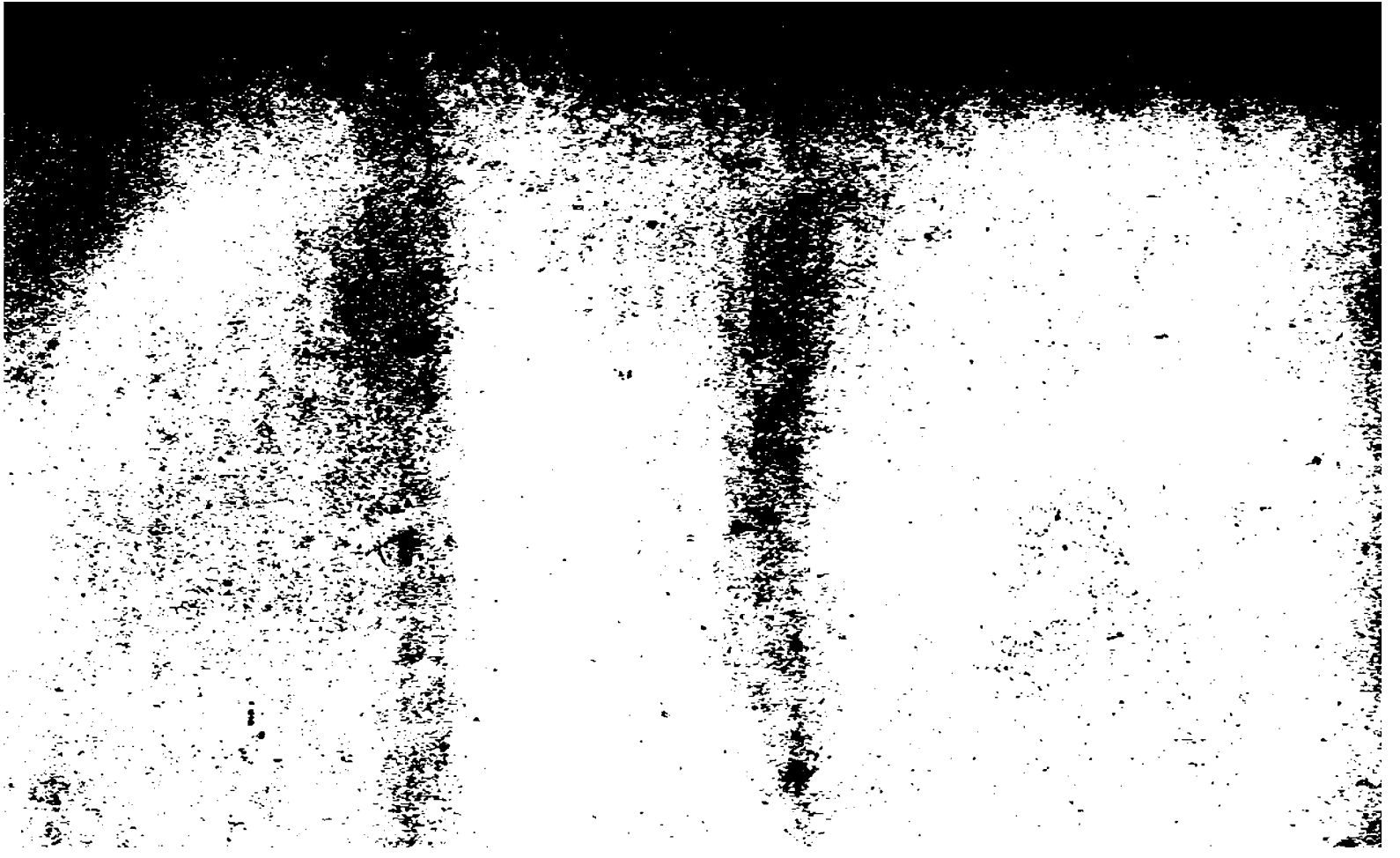
SONAMARG BRIDGE.



however, becomes much grander, and the road more difficult, for some of my baggage did not turn up for several days after we left Kulān. The few inhabitants met with above Kulān seem to live chiefly by tending flocks, and are located there by the Kashmir officials, for the purpose of keeping open the communication with Tibet during the winter months, and of assisting travellers during summer. Nothing could exceed the beauty and grandeur of the scenery in the Sind Valley; and large game — bears and the Kashmir stag—being comparatively plentiful, this is one of the favourite resorts of visitors to Kashmir. We halted on the 18th June at Sonamarg, and were joined by the Yārkand envoy. Here I first saw the Himalayan Chough and the Orange bullfinch; the latter was very abundant, and so tame that it seemed a cruelty to shoot it. At Báltal we were at the end of the Sind Valley, and there we encamped, near a large log-hut, at the foot of the Zoji-la Pass, which leads over into Tibet, or rather into the Drás Valley.

Kashmir has been so often and so well described, and is so well known, being visited by hundreds of Europeans every summer, that it appears superfluous to say much more regarding it. As regards vegetation and climate, it somewhat resembles the mildest parts of the South of England. Cherries and apricots ripen in June and July, grapes in August, and apples and pears in September and October. The clouds which bring up the periodical rains from the Indian Ocean do not easily surmount the snowy range which bounds the valley to the south, and consequently the "rains" are never so abundant, nor so regular, as on the Panjáb side of this range. There are frequent showers

throughout the summer months, as in England, and a little snow usually falls before Christmas; but very heavy rain or snow seems to be confined chiefly to the mountains which surround the valley, and there is much more rain, according to my experience, in all the smaller valleys than about Srínagar itself. Although Kashmir and the hills around it appear to be very favourable to animal life, yet there is a wonderful scarcity of animals, either large or small, which it is difficult entirely to account for. Bears and Bara-singa (the Kashmir stag) were more plentiful a few years ago, but are rapidly being destroyed. In September and October, during the rutting season, stags are still to be obtained in considerable numbers. I have occasionally seen the Monal pheasant, *Lophophorus impeyanus;* but I never saw a hare, and do not think there are any in Kashmir. One may walk for days through the forest without seeing anything but a few small birds.

The chief attraction for sportsmen is the Ibex, which is always found close to the snow, and chiefly on the hills to the north of Kashmir. It was never easy to get, but now it is so scarce that, after three months of hard work, a bag of two or three Ibex with fair horns is considered very good sport. There is probably no shooting which gives so much exercise and sport, with such a small destruction of game. A sportsman who wants Ibex must confine himself entirely to them, for a shot fired at smaller game is very likely to frighten the animals of which he is in search. He has to climb day after day, from sunrise till dark, over the most break-neck ground, which is almost impracticable without grass shoes—

instruments of torture I never could stand. He has to live on chupatties (unleavened cakes) and milk, or on biscuits and sardines, when, as often happens, no supplies are to be had within thirty miles. At night he has often to bivouac under shelter of a rock with snow all round, for it is not always possible to carry even the smallest of tents.

Three months of this life, notwithstanding the exposure, effects a wonderful improvement in the health of any one, who has been thoroughly done up by several years of service on the plains of India. I have seen a man walking regularly his thirty miles a day over difficult ground, who, on starting two months before, had to ride, or get carried, two thirds of every march. The remarkable thing is that even a person of delicate health does not suffer from the exposure, and one never by any chance catches a cold, at least in the mountains beyond Kashmir, where the climate is excessively dry. There is probably no climate in the world so good for invalids as that of Tibet, the region we were now about to enter.

IV. LADÁK.

At daybreak on the morning of the 20th June, we started from Báltal to cross the Zoji-la Pass, the summit of which is 11,000 feet above the sea-level, and about 2000 feet above Báltal. ("La" in Tibetan means a pass.)

Our road lay to the north, and for the first mile followed one of the two streams which here join to form the Sind river; the stream which we followed rises on the top of the pass, the other flows down a

beautifully wooded ravine from the south, and joins the other where we encamped at Báltal. Leaving the stream, we then mounted a very steep ascent for about four miles, through a pretty wood most of the way. An Ash and a Maple were common; the latter is *Acer pseudoplatanus*, identical with one of the European species often planted in England. The black currant here grows wild. There were almost no pine trees, which always seem to prefer a northern exposure. Towards the top of this first ascent, the arboreal vegetation is almost limited to birch; but there is beautiful green sward, with a great profusion of wild flowers, right up to the snow; primroses of several species were the most noticeable. In some places there were quantities of wild onions. The road we had ascended was in many places rather trying to the nerves, being very steep, and sometimes consisting merely of a platform of brushwood attached to the face of the precipice. This road, owing to its steepness, is quite impassable for baggage animals after a fall of snow, and it is then necessary either to wait at Báltal until the snow has melted, or to follow the stream up a very narrow rocky gorge, with precipices of from 500 to 1000 feet on either side. This gorge, however, is only practicable when filled up by snow to about fifty feet in depth, as it usually is early in the season—it is then the usual route; and at that season, in order to avoid the avalanches, it is necessary to start at night and get over the pass before sunrise. Avalanches do not fall until late in the day, after the sun begins to melt the snow.

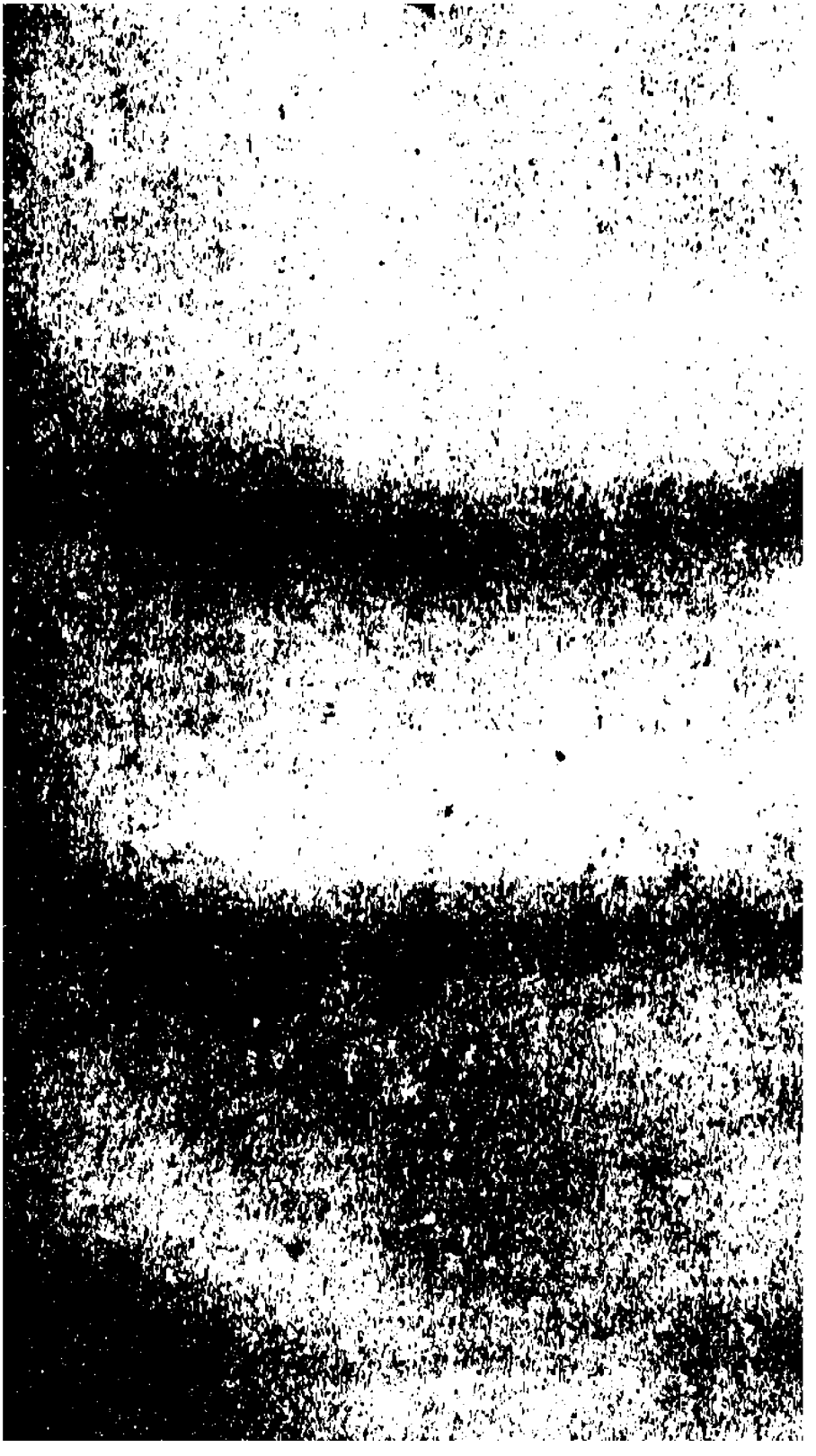
From the top of the first ascent, 1500 feet above Báltal, the view is one of the grandest I have ever

HELIOTYPE *L. REEVE & Cº*

BALTAL.
P.36.

HELIOTYPE *L. REEVE & Cº*

ROPE BRIDGE ABOVE DRAS.
P.40.



seen; but after Kashmir, it was not half so much appreciated by us as on the return journey, after months of sterile mountains. To the west, there is a magnificent panorama of the Sind Valley for about ten miles; the valley is only about a mile wide at its upper end, and the mountains rise on either side at a very high angle. On the slopes with a northern exposure the pine forest is only here and there interrupted, where avalanches come down; but on the north side of the valley the forest is much more open, and there are numerous grassy glades. We halted for an hour to enjoy the view, and then, bidding adieu to Kashmir and its beautiful scenery, turned our steps towards the pass.

For a short distance, the road is almost level, along the brink of the gorge already mentioned; then comes a difficult descent, to the stream we had left at the foot of the pass, which is here crossed on a bridge of snow, the remains of an avalanche. We saw numerous carcases of horses which had fallen over the precipice, and, to avoid accidents, all our pack-horses were unloaded, and the baggage taken across by instalments. After crossing this ravine, there is a very gradual winding ascent for about three miles, to the top of the pass. On our right we passed a remarkably fine waterfall, and further on a small lake. Just beyond this is the watershed, where one of the streams, entering the pass from a gorge on the right, sends part of its waters towards the south, to fall ultimately into the Jhelum, and the remainder flows in the opposite direction towards the Indus. The pass for many miles is an open winding valley, and so level that it

is difficult at first to find where the watershed is. From the top, the descent for five miles was very gradual along the right bank of a stream, which soon becomes the Drás river; it was still in many places bridged by enormous masses of snow. We halted for breakfast close to the abrupt end of a glacier, which fills a large valley on the right. We were here joined by a friend, who was shooting ibex in a neighbouring valley or "nulla," as sportsmen here call them. After breakfast, we walked on to near Matáyon, the first hamlet on the Tibet side of the pass, about fifteen miles from Báltal, and encamped on the left bank of the Drás river. On the pass I noticed very little animal life. The Cuckoo was very common, on the Kashmir side, as far as birch-trees extended, a little beyond the top of the first ascent; on the pass itself, the Himalayan Chough and the Yellow-headed wagtail were the only birds I saw.

Marmots, *Arctomys hemachalanus* of Hodgson, called by the Kashmiris "drin," and by the Tibetans "pyā," were very abundant along the whole march, uttering their shrill cry, and disappearing in their holes whenever we approached them. They are very difficult to shoot, unless one has time to watch in concealment, until one of them ventures some considerable distance away from its hole. One specimen I obtained measured twenty-two inches in length, including the tail, which was twelve inches.* It was loaded with fat under the skin. The flesh is said to be tolerably good eating. Marmots were not

* This specimen is described by Dr. Anderson in the Zoological Society's Proceedings, or 1871, page 561.

again seen until after crossing the Sánju Pass, near the plains of Yārkand. I got one solitary fish near the top of the pass; but this—with all my fish, reptiles, &c.—was preserved in spirit, and the continual jolting destroyed the labels, so that I could not tell with any certainty, on my return to the Punjab, where each specimen had been obtained. I ought to have had small labels of lead with numbers stamped on them, and fastened to the specimens by copper wire.

The Zoji-la Pass is the most difficult part of the road between Kashmir and Lé, and with the exception of the Sánju Pass is the only one, along the route we followed to Yārkand, which is ever rendered absolutely impassable by snow for any length of time. It usually remains closed to ordinary traffic from December to May; but I am told that a party of about twenty men force their way across, with letters, once a month during winter, and thus keep up the Maharajah's communication with his Tibetan possessions throughout the year. It is usual for traders, when crossing, to offer one or more goats as a sacrifice, in the event of all the loads getting over in safety. On the Tibetan side of the pass there is almost no jungle, with the exception of a few clumps of dwarf willows and birches fringing the Drás river at sheltered spots; all the hills within sight are covered with green grass up to 11,000 or 12,000 feet, except where they are rocky and precipitous.

On June 22nd we marched about eighteen miles along the left bank of the Drás river to Drás. About half way we passed the village of Pandrás, where there is a little cultivation. Below Pandrás the *Prangos pabularia*, which is called "prangos" in Tibetan,

and was once supposed to be a cure for "rot" in sheep, is very abundant. In many places it grows to a height of three feet, and forms the bulk of the herbage; but although dried for winter fodder, it does not appear to be a favourite with cattle, except when nothing else can be got.

At Drás there is a wide undulating valley, about twenty miles long from east to west, and eight to ten wide, with plenty of good pasturage. It is surrounded by rugged peaks covered with snow; and the river, which is not usually fordable, flows on the south side close under the mountains, and is spanned at several points by picturesque rope bridges, made from the roots and branches of birch brought from the foot of the pass; for there is scarcely a tree to be seen here, with the exception of a small clump of willows and poplars near the encamping ground.

We encamped at the rest-house, where the officials of the Drás district have their head-quarters. Close by there is a small loopholed masonry fort, surrounded by a ditch, and capable of accommodating about 100 soldiers. At the time of our visit it was garrisoned by a dozen men.

The people now began to exhibit the Tartar type of countenance; and most of them—the Buddhists—wore their hair in long pigtails, hanging down their backs. Here, for the most part, they understand Hindustani or Kashmiri, and a great many of them are Mahomedans, but no mosques are to be seen. One man we questioned said he trusted to the priest, who lived at a mosque at Kargil, thirty miles distant, to do all the praying for him, and that he never troubled himself about it. He maintained, however, that he

was a Mahomedan, and not a Buddhist or Hindu, and beyond this he seemed neither to know nor care anything about religion.

There is a polo-ground here, as at every Tibetan village where sufficient level ground can be found; "polo," or hockey on horseback, being the national game of the country.

On June 23rd we continued our march along the Drás river seventeen miles, to Táshgám. The cultivation along the road consisted of buckwheat, peas, and barley; the last was only about six inches high, and showed no signs of coming into ear. I saw very few Yaks of the pure breed, but crosses between the cow and Yak were common, and are said to be superior in some respects to either parent.

I noticed very few sheep, and only occasionally a small herd of poor-looking goats. The people here, as in most parts of Ladák, are wretchedly poor. On leaving Drás I saw the first magpie (*Pica bactriana*), which was afterwards met with at every village up to about 13,000 feet, and was once seen near the Yārkand plains. In habit and general appearance it much resembles the English magpie. It seems strange, as Adams has remarked, that this bird should prefer the wastes of Ladák, and never cross the passes into Kashmir, where one would expect its food must be much more plentiful. The same remark applies to the blue pigeons, which are seen in enormous flocks in Ladák. I shot three species, one of them very rare; but at the time I did not know this, and only secured one specimen.

Beyond Drás the hills are still covered with grass, but this soon ceases as we proceed down the river;

and for several miles above Táshgám, where the valley becomes very narrow, vegetation is very scanty. Along the river there are a few stunted bushes of the pencil-cedar, *Juniperus excelsa*, and at Táshgám there are several acres of Tamarisk and Myricaria jungle. On the return journey in October I here shot an ermine, *Mustela erminea*; and as none of the villagers could give a name to it, the animal is probably rare. At the same time I also shot a young Lammergeyer. A pair of them were feeding on the carcase of a horse which had died quite recently. This was the only occasion on which I saw these birds touch carrion.

On June 24th we marched over fifteen miles to Kirkichu, keeping along the Drás river the whole way. A mile after leaving camp we crossed the Drás river by a very dilapidated wooden bridge. As I neared the bridge, our pack-horses were in the act of crossing, and seemed to have great difficulty in keeping their feet. Suddenly one missed its footing, made a few plunges, and disappeared for ever in the roaring torrent beneath. It turned out to be a serious loss, for it was the pony which carried some valuable books belonging to Kalíl, the Arab priest, who had brought them all the way from Mecca as a present to the Atalik Ghazi. When I came up, Kalíl was standing on the bridge, in a state of utter despair. The pony was never seen again, but the books, being light, were found floating in the river half a mile lower down. On this march I saw large flocks of the pretty little gold-headed finch, *Metopoma pusilla*, in full breeding plumage, and a Dipper (*Hydrobata*) was very abundant in the river. The wall-creeper, *Tichodroma muraria*, was also common;

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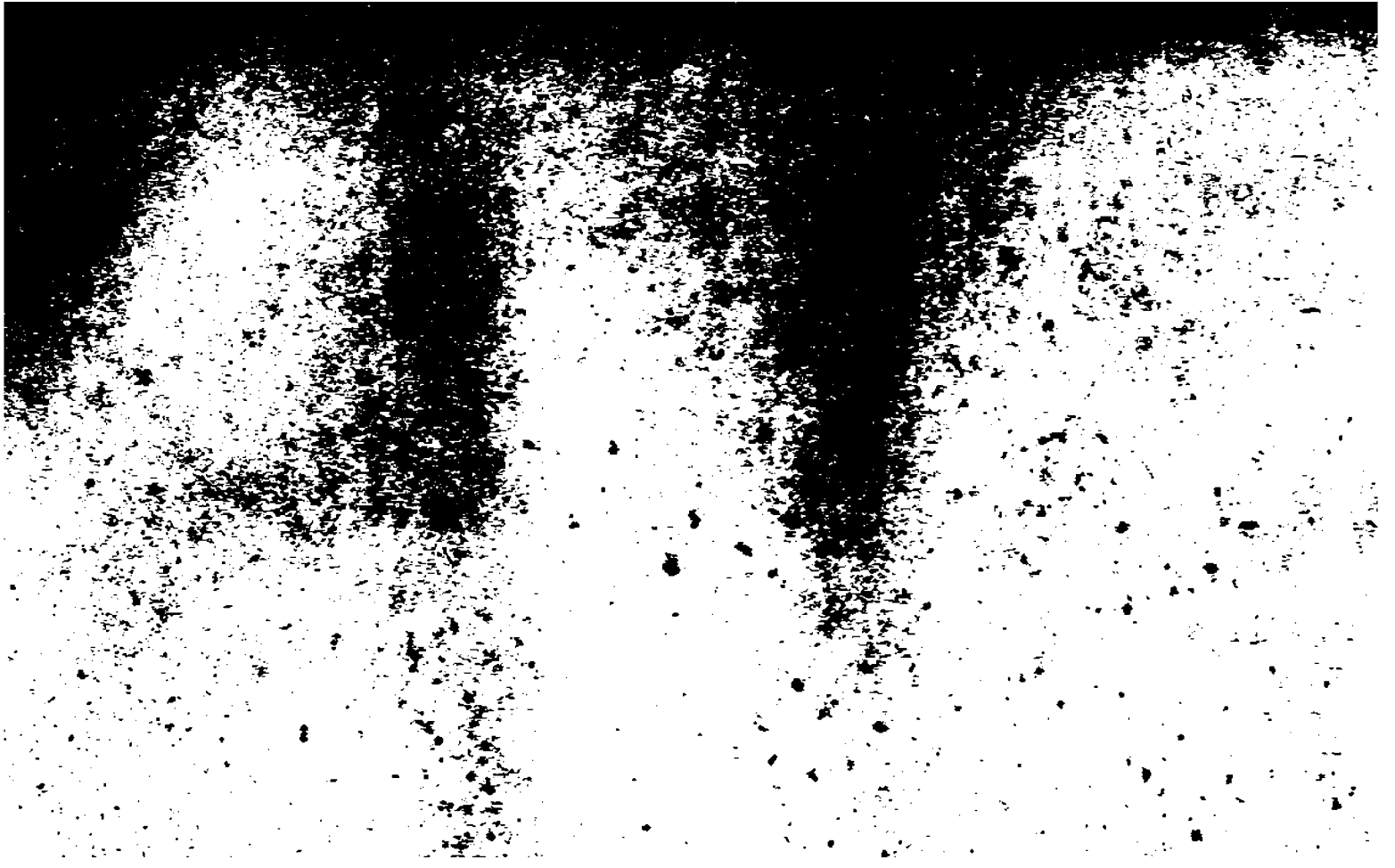
DRAS RIVER AT KIRKICHU.

P.42.

HELIOTYPE L. REEVE & Co

PASKYUM.

P.43



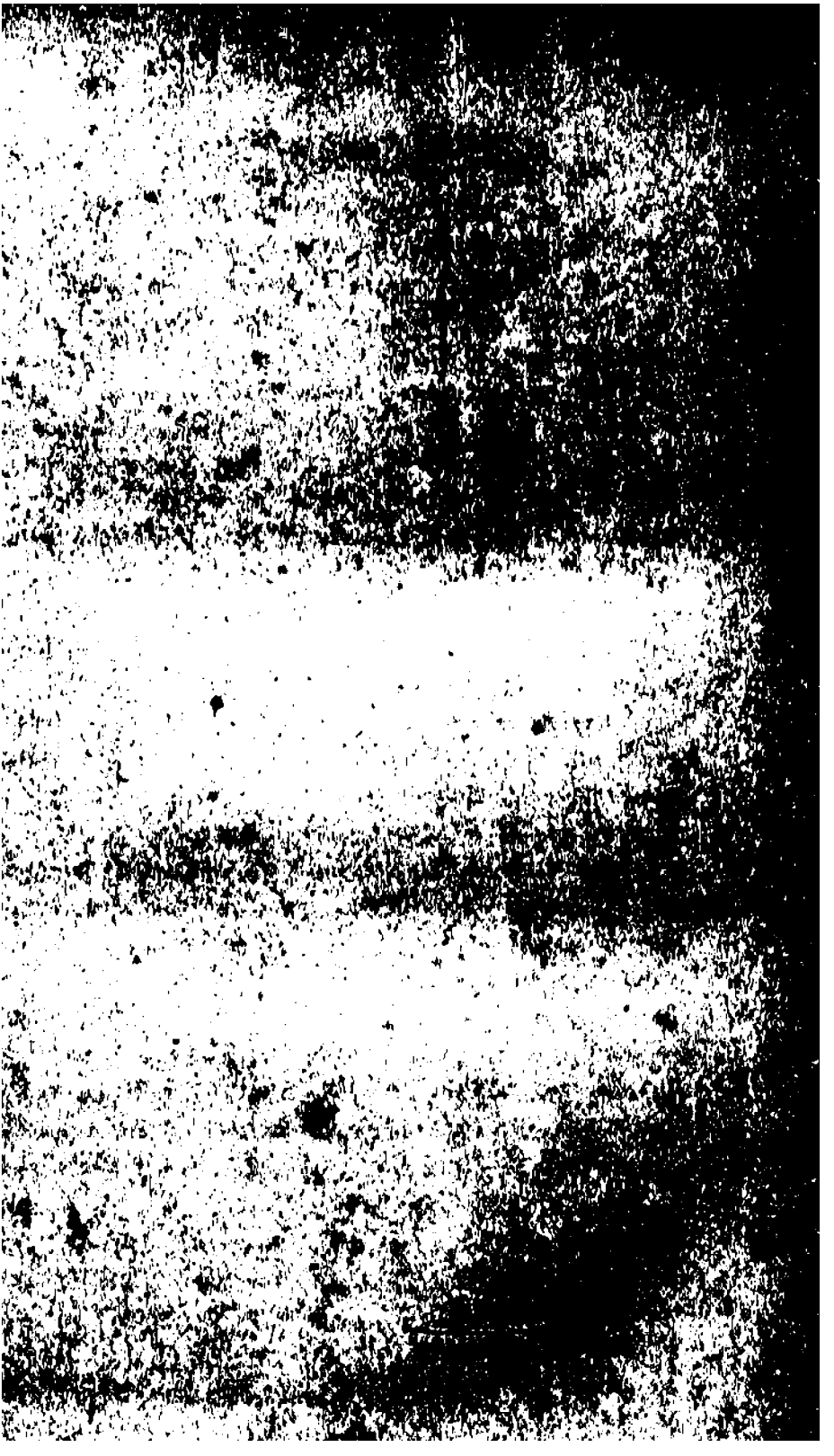
but I never succeeded in securing a specimen. About Kirkichu the red currant grows wild in great abundance; it is not cultivated in any part of Ladák, so far as I have observed. Beyond this, a striking feature in the landscape was the tall Lombardy poplar, which is grown at every village; and its appearance is the more noticeable that there are almost no other trees to be seen. About midway between Táshgám and Kirkichu there is one clump of pencil-cedar trees with stems four feet in girth and twenty to thirty feet high, and this and the *Elæagnus* are the only large indigenous *trees* I saw in Ladák.

On the 25th we marched to Paskyum, thirteen miles. Our road lay first down the narrow rocky gorge of the Drás river for five miles, to where this joins the Kargil river, and then we turned up along the left bank of this stream to Kargil, where there is a fine open valley with a good deal of barley cultivation, and numerous clumps of large willows and poplars. The Kargil river flows through the valley from south to north, and is about the same size as the Drás river, which it joins two miles below the village. We crossed the stream by a wooden bridge, near the point where it is joined by another stream from the east, and along which our road lay to Paskyum. Kargil, like Drás, is the head-quarters of a district, and a number of the Maharajah's officials reside there. As at Drás, there is a small square loopholed fort, with round turrets at the corners. The fort is garrisoned by about twenty Kashmir soldiers.

Passing Kargil, we proceeded towards the east, and after about seven miles came to Paskyum, a

valley still more beautiful than Kargil, and with much more cultivation and trees. In the afternoon there was a muster of all the people from the country round. Most of our porters and baggage animals had to be changed here. In front of the rest-house at Paskyum is a fine polo-ground, shaded on the south side by a row of very tall poplars; and here we saw played the national game of "polo," already mentioned.

The polo-ground is quite level, about 300 yards long and fifty broad. The number of players was usually about fifty, all of them mounted on the hardy little ponies of the country, and each man armed with a very curious looking club, about three feet long. Two leaders are selected, who alternately choose men for their respective sides; or men from one district play against another district. In the excitement of the game it is, of course, necessary to be able at once to distinguish to which side each man belongs, and this is managed by each side wearing a head-dress of a particular colour—thus, one side had red turbans, the other side white ones. The musicians, who seem to be quite indispensable whilst polo is being played, took up their position cross-legged near the centre of the ground, and a little to one side; and we, the spectators, sat in a verandah in the upper story of the rest-house. The musical instruments consisted of half a dozen small drums, and as many rude clarionets, which produced a lively, but very monotonous, air, not unlike a "pibroch;" and as soon as everything was ready and the music began, the leader of the side which had the ball rode along at a gallop, followed by all the others, and when he arrived near the



HELIOTYPE

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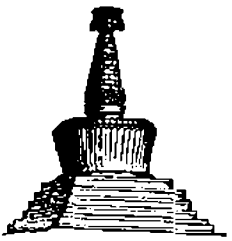
centre of the ground, he threw up the ball and very cleverly struck it with his club, sometimes succeeding at the first stroke in driving it to the goal. Usually the ball was intercepted, and a very animated scene then ensued, each side trying to urge the ball towards their own end of the ground; and the side which first succeeded in driving it beyond the boundary mark, at their end of the ground, won the game. Each game lasted only for a few minutes, but the fun was kept up for several hours, and sometimes there was intense excitement, and very great skill in horsemanship displayed. At last, both men and horses seemed to be quite exhausted, and we then had a series of entertainments requiring less active exertion.

Much amusement was created by a small magneto-electric apparatus which I had with me, for the Tibetans seemed never to have experienced the effects of electricity before.

On June 26th we marched from Paskyum, twelve miles, to Shérgul, keeping along the same valley the whole way, crossing and recrossing the stream several times. On the way we passed two small villages. Here, in October, I got several teal. Near Shérgul the valley becomes a narrow rocky ravine, and a détour has to be made over some very steep spurs. At Shérgul, the valley again opens out, and there is a good deal of cultivation. The first Buddhist monastery, called Gonpa (solitary place) is here met with; and the village is filled with those curious Buddhist monuments to departed Lamas, called "chodten" or "chortens," which form such a prominent feature in every Tibetan village beyond this point. The

accompanying woodcut will give an idea of what these chortens are like. They are built of masonry and are often painted in gaudy colours, and vary in height from fifteen to thirty feet. In Ládak, where the Buddhist religion prevails, these structures are met with at every turn of the road, and near large monasteries they may often be counted by hundreds. The monastery at Shérgul is a very small structure, perched as usual on a cliff high up above the village. There are said to be only half a dozen monks in it.



On the return journey, in October, I here saw large flocks of the Yellow-billed chough feeding on the fruit of the buckthorn, *Hippophae*; this bird was not nearly so common as the red-billed chough, and was much wilder.

On the 27th June we marched to Karbu, eighteen miles. We followed yesterday's stream for four miles to Mulbeck, where there is a very picturesque monastery, on the very top of a rock about 200 feet high. A little beyond the village, and close to the road, there is a colossal image of Buddha, about twenty feet high, carved on a solitary rock, one side of which is almost entirely occupied by the image. A mile beyond this we commenced the ascent of the Namyika Pass, the highest point of which is about 12,000 feet above the sea; the ascent is about five miles long, and very gradual the whole way to the top, over undulating desert ground formed of clay and fragments of rock. About half-way to the top there is a spring of fresh water, where I shot some birds (desert larks) as they came to drink.

Although the top of this pass was only 12,000 feet

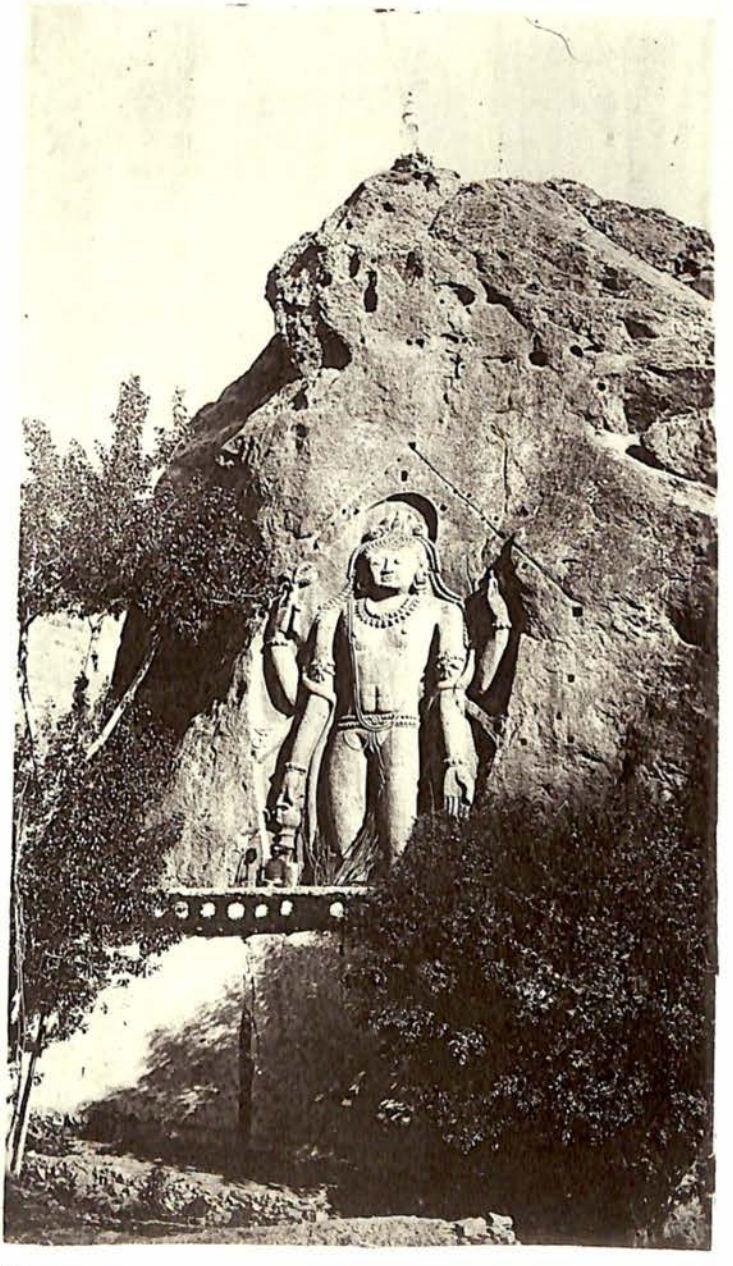


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IMAGE OF BUDDHA CARVED IN A ROCK

P. 46.

A KASHMIR SOLDIER STANDING NEAR THE RIGHT HAND OF THE IMAGE SHOWS ITS SIZE

high, several of our men suffered a great deal from difficulty of breathing, which continued for several hours after we reached camp at Karbu, 600 feet lower down, and some of our party could get no sleep during the night from the same cause. At Karbu there are extensive remains of a large fort, built on a very inaccessible-looking rock, about 300 feet above the village and immediately behind it. Some wonderful stories were related to me about the taking of this fort, when the garrison had to surrender for want of water, for the supply of which no proper provision had been made.

On the 28th June we marched fifteen miles, to Láma Yuru, crossing the Fota-la Pass, which is nearly 14,000 feet above the sea. To-day none of our men suffered from the altitude. Near Láma Yuru, which is about 2,000 feet lower and just visible from the top, we first saw those long walls or heaps of stones called "mānés." Each stone on the top of the pile has the Tibetan inscription, "Aum! Mani-padme, hun!" which means, I believe, "Hail! to the jewel in the lotus, hail!" The inscriptions vary slightly, but the above is the usual one. Some of these mānés are more than half a mile in length; they are from six to eight feet high, by ten to fifteen feet broad, and are often very substantially built. On some of the large ones there must be hundreds of thousands of stones, each bearing an inscription. I was told that the lamas had sometimes been paid as much as £10,000 for constructing a mānć, and writing the inscriptions. At either end of the large mānés there is often a chorten. They always run parallel to the roads, or rather footpaths, one pathway running on either side

of them, and the Tibetans, in passing, always keep on the left-hand side. When a Tibetan is about to undertake any task it is usual to go to a Lama and purchase a few slates with the mystic words carved on them; these are deposited on some mānē, and are supposed to ensure success in the work about to be undertaken. At Láma Yuru there is a very large monastery, said to be inhabited by about a hundred Lamas. I noticed in Ladák several sects of these priests, distinguished by the colour of their dress; thus in some places yellow Lamas prevail, but a dull red is the usual colour. The yellow Lamas were said to be a more modern and stricter sect. They are all jolly-looking fellows, and not unlike, in their dress and general appearance, the monks one sees in Roman Catholic countries. They own a great deal of the land, which they cultivate themselves, and many of the monasteries are said to be very wealthy. In all the monasteries the prayer-wheels form a prominent feature. These are cylinders of wood or copper, of very various sizes, and each contains a roll of paper or parchment, on which prayers are inscribed. Each turn of the wheel is equal to repeating a prayer; but if turned in the wrong direction, I believe it represents an imprecation. Most of the prayer-wheels are turned by hand, but occasionally one sees near a village a large one turned by water.

Half the population of Ladák seem to have adopted the monastic life. I saw few nuns, or perhaps I did not distinguish them. Polyandry is said to be common, all the brothers of one family having one wife in common. From our rapid progress through the country and ignorance of

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TUKTZE A VILLAGE NEAR KARBU.

P. 47.

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MANE NEAR LAMA YURU.

P. 47.

the Tibetan language, we had not an opportunity of learning much regarding the people.

On June 29th we marched from Láma Yuru to Nurla, twenty miles. The road for the first four miles descends rapidly down a narrow gorge, and at a little distance from the village it is seen that Láma Yuru and all the cultivated land about it are situate on a mass of lacustrine deposit, consisting of very fine clay several hundred feet in depth. Throughout Ladák remains of these deposits are very extensive, and sometimes extend up to over 15,000 feet above the sea level; which leads one to infer that at one time there was a great inland sea covering most of the country, or more probably a number of detached sheets of water, with the tops of the higher peaks and ranges forming islands in their midst. Enormous terminal moraines of former glaciers are still to be seen in the neighbourhood of Lé, where there is now scarcely any snow. Most of the waters of Ladák have drained off to the sea, and the Himalayas prevent their return in the shape of clouds; and I believe there is good evidence to show that, even within the memory of man, some of the lakes have been steadily and rapidly diminishing.

At the bottom of the gorge we came to a stream flowing nearly due north, and for eight miles followed it through a very narrow rocky ravine, with precipices 500 to 1000 feet high on either side. About two miles above where this ravine opens into the Indus valley I noticed a vein of serpentine. The Indus, which here flows from east to west, is sometimes called the Sengé Tsangpo—*i.e.*, Lion River. The whole country hereabouts is almost devoid of

vegetation, and the hills are mostly composed of granite, gneiss, and schists of a chocolate colour. Here and there one finds a tuft of grass, and along the stream I saw a few patches of *Tussilago*, *Plantago*, and mint. The scenery is of the most rugged and grand description, but soon becomes wearisome from its monotony.

To-day I saw a species of wild sheep at a little distance, but could not get a shot. A mile above where we struck the Indus we came to a bridge, which spans the river at a spot where the stream is only forty feet wide, with precipitous rocks on either side. There is a small fort and custom-house at the northern end of the bridge, where half a dozen soldiers are stationed. We crossed this bridge, and two miles further up the river came to the pretty little village of Kalsi, or Kelatzie, where there is some cultivation at a spot where, for two miles, the valley widens considerably. There are here numerous orchards of apple, pear, and apricot trees, and I also noticed some fine large walnut trees. We passed Kalsi and halted five miles beyond, at the village of Nurla, which is similarly situated to Kalsi in the midst of a little oasis of rich vegetation. Here I noticed for the first time in Tibet the Elæagnus; it is called Sir Sing or Sir Shing, and the roots are said to be used for making matches for matchlocks. In Kashmir the roots of an elm, and in the Panjáb those of the Phulai (*Acacia modesta*), and the aërial roots of the Banian (*Ficus indica*), are used for the same purpose.

On the 30th June we continued up the Indus for sixteen miles to Sospul. The river is here about 100 yards wide at this season, and is seldom fordable.

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RAVINE BELOW LAMA YURU.

P. 49.

HELIOTYPE *L. REEVE & Co*

FORT AND BRIDGE OVER THE INDUS RIVER AT KALSI.

P. 50.

During winter, I believe, it freezes, and then becomes a regular thoroughfare.

On the 1st July we left the Indus and ascended the right bank to Nimu, ten miles distant, where there is an open cultivated plain several hundred feet above the level of the river. On the return journey I went direct from Nimu to Nurla by the high ground without going to Sospul. We halted half-way at a place called Hemis Shukpa, where there is a remarkable grove of very ancient pencil cedars (*Juniperus excelsa*); some of them are over thirty feet high, and have stems ten to fifteen feet in girth; there are about fifty large trees growing on a small knoll surrounded by a wall. Several of the largest trees have been dead for many years, but none of them are ever cut down, nor is it allowable to remove any of the dead branches for fuel. An old villager, about eighty years of age, assured me that when he was a boy the clump was precisely in its present condition, and the trees just as large. He said that his father and grandfather used to speak of them as having existed in their day. There are no trees of this sort near, and when I asked if there was any tradition as to how they originally came there, he said they had not grown from seed, for hundreds of pounds of seed fell from the trees every year, none of which ever germinated. This is truly the case, for the trees were loaded with ripe seed, and the ground strewn with it, but not a single seedling was to be seen, although cattle are kept out of the enclosure. The old man said he believed they had originated like a great many other things about which we knew just as little. "Smallpox, for instance, how does it come

into our villages? No doubt the trees come in the same mysterious way." I asked about the trees being sacred, and he said there could be no question about that, and it was very unlucky to meddle with them; for an Englishman had come to the village many years ago, and none of the villagers being at hand to prevent him, he made his servants pull down some branches from one of the dead trees to make a fire. The sky at the time the desecration occurred was clear and the air still, but within half an hour a fearful thunderstorm, with rain and wind, such as had never before nor since been experienced in Ladák, burst over the village and completely destroyed all the crops. Ever since that time the "Shukpas" had been most carefully preserved.

On the 2nd July we marched eighteen miles to Lé. Near Nimu, we passed up a ravine where there are some extraordinary mud pillars, often fifty or more feet in height, and each with an enormous stone on the top. These pillars are met with in many other places, and sometimes are very numerous and of the most fantastic shapes. Many of them seem as if the slightest push would throw them over, and one cannot resist the inclination to test their stability by throwing stones at them. The formation of these pillars is very simple; the valley had originally been filled up with clay, on the surface of which were the large stones which are now seen on the top of the pillars. The clay under the stones was protected from the rain, which has washed away all the surrounding materials and thus formed these extraordinary pillars.

The Indus valley, three miles beyond Nimu,

HELIOTYPE *L. REEVE & Co*

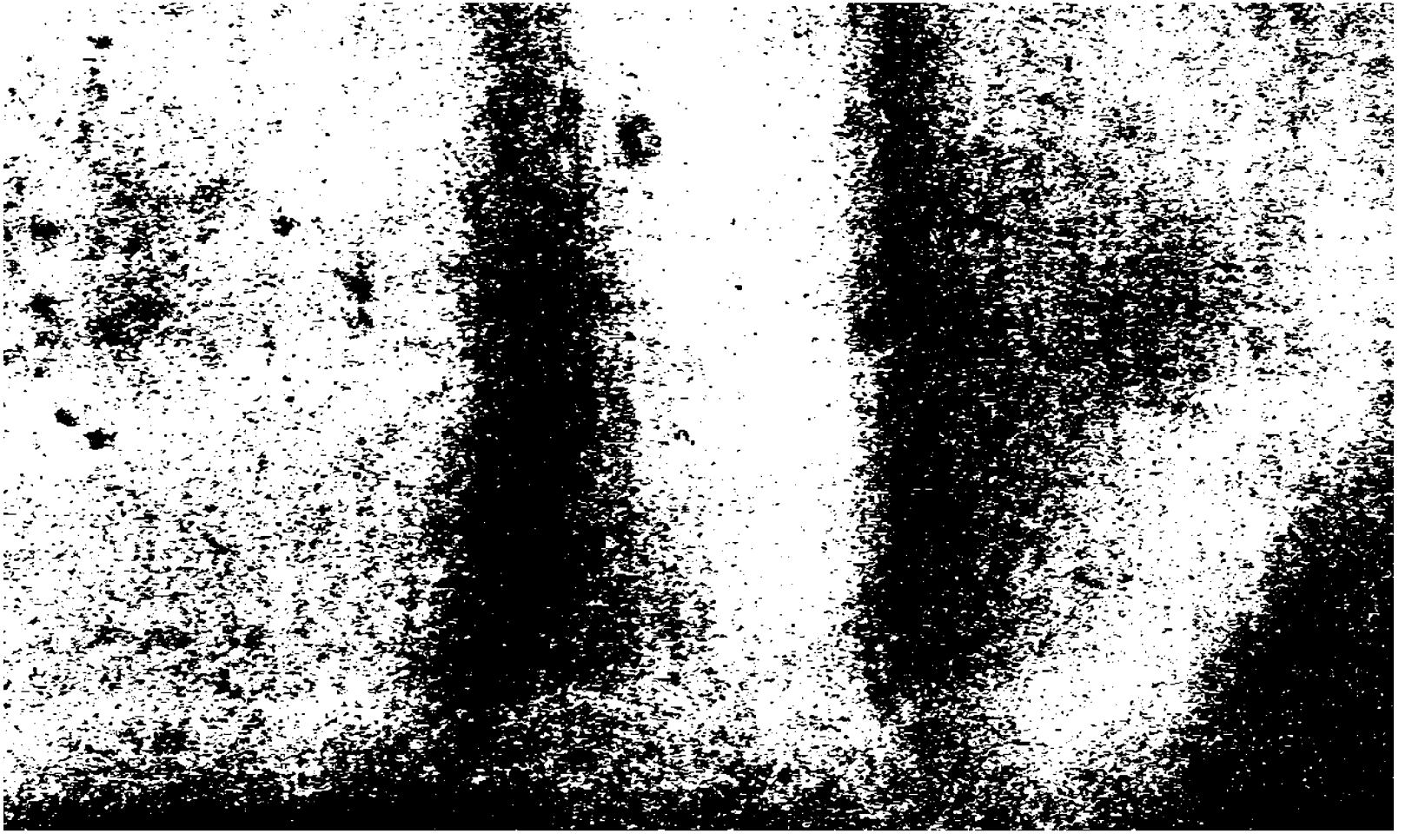
PENCIL CEDARS AT HEMIS SHUKPA.

P. 51.

HELIOTYPE *L. REEVE & Co*

GOKRA.

P. 71.



widens, and is from six to eight miles across for a distance of forty or fifty miles, and the river flows through the centre of it from east to west. There are numerous villages and fields all along the banks; but for a mile on either side, and between the fields and the foot of the hills, there is a desert waste of sand, gravel, and large boulders. The granite mountains near Lé are in many cases very much decomposed, and there being no rain to wash it away, as in many parts of Ladák, the débris which falls from them by the action of the weather often forms slopes of many hundred feet in height, sometimes composed of fine sand; in other places these slopes consist of large angular fragments.

At Lé Mr. Shaw joined us, on the 3rd July, having left England on the 20th May. It was necessary to halt here for a week to make preparations for our further journey. The extent of these preparations, and the care required to secure their completeness, will be understood when I state that we had before us twenty-seven marches, over country at an average altitude of nearly 15,000 feet, and almost an absolute desert the whole way. We could not count even on getting grass for the pack-horses, and had to carry enough grain to feed them until we should arrive at the Kirghiz encampments, on the Yārkand frontier. Part of our baggage had to be carried on ponies, and the remainder by Tibetan porters; for every two men who accompanied us a third was required, to carry food for himself and the other two. The same proportion of extra baggage-animals was necessary to carry grain for them. Allowance had also to be made for horses breaking down on the road. On

starting from Lé our own party numbered about sixty individuals, and we had 130 pack-horses. The Yārkand envoy and his party added considerably to the size of the cavalcade.

We had as yet heard no news of Tára Singh and his companions, who had gone on before us from Srínagar, but the season was too far advanced to allow of our waiting for their return with information regarding the state of affairs in Yārkand; so, having completed our arrangements on the 6th July, we resolved to start the next day.

The conversation carried on of an evening round the camp fires was a wonderful mixture of tongues: English, Hindustani, Bengali, Kashmiri, Persian, Turki, and Thibetan. We talked Hindustani to our followers and Persian to the Yārkandis, who, amongst themselves, talked Turki. By means of an interpreter who spoke Hindustani and Tibetan we communicated with our porters. Some of the men were from Calcutta and talked Bengali to each other, and our Kashmiri followers talked Kashmiri, which is said to be a mixture of all the languages of Asia.

On July 7th we made a short march of ten miles to Tikshé, a small village on the banks of the Indus, and we now ascertained what we before had suspected, namely, that the pack-horses supplied by the Wazír, the highest official in Ladák, were quite unequal to the work before them. Fortunately we had taken a good many spare ponies, to allow of the worst being weeded out; but, had there been time to replace them, we would have rejected the whole lot. We had obtained the horses through the Wazír, and as we agreed to pay the same rates as traders do, we had

a right to expect to be equally well served. The terms on which traders engage horses are these: Each horse is to carry 240lbs., and the owner of the horse arranges for the supply of food and undertakes all risks to his animals. The distance to Shâhidulla from Lé is about twenty days march, and the rate paid is 3*l.* 5*s.* for each load. The ponies can be purchased for about 4*l.* or 5*l.*, consequently large profits are made by the owners of the horses, and they can afford to take a number of spare animals to provide against a breakdown. We not only agreed to pay the same rates as the traders, but, to make our progress more rapid and certain, diminished each load by one third, and the Wazír undertook to see that we had a sufficient supply of grain; he further agreed to accompany us as far as Pamtzil, the last place where grass was found, and to wait there until he heard of our safe arrival at the Karakásh valley.

From Lé, our road lay at first for twenty miles to the east, and along the right bank of the Indus, which here flows nearly due west. We then left the river near a village called Rambírpur, which is inhabited exclusively by slaves and the officers in charge of them, and turned to the north up a well-cultivated valley, encamping at Chimré, near the foot of the Chang-la Pass. Here one of Major Montgomerie's pundits joined our camp; he was provided with all the instruments necessary for surveying the country, but unfortunately he came to us openly in the character of a surveyor, and his arrival excited so much suspicion in the minds of the Yārkandis, who, like all Orientals, consider a survey only a preparatory step to annexation of territory,

that Mr. Forsyth very reluctantly had to cause the pundit, and the two men who were with him, to retrace their steps, and they left our camp that night.

Next day we made a short march of four miles to the village of Sakté, at the foot of the pass. On the way I saw peat being made—the people called it "Spang"—it was of very inferior quality. This was the only time I had seen peat in Asia. There are three or four passes over the granite range to the north of the Lé valley; viz. the Kardong pass to the north of the town of Lé, the Digar-la, a little farther to the east, and the Chang-la still farther east. The last mentioned is said to be easier than the other two, and was the one we proposed to follow; the fourth is a few miles to the eastward, and was the one crossed by Mr. Hayward.

Both in July and October we found very little snow on the Chang-la, although it is 18,000 feet high. We crossed this pass on the 10th of July, marching sixteen miles to the Chortak lake; and this being the first occasion on which almost every one in camp suffered from the rarity of the air, the following observations, made after half an hour's rest at the highest point, may be of interest:—

July 10—Mercurial barometer 15·73.

Attached thermometer 61° F.

Water boiled at 181° F.

I walked to the top and my pulse was	80,	and respiration	26 per minute.
Mr. Forsyth, who rode . . .	100	,,	22 ,,
Mr. Shaw, who rode	94		
Mullik Kutub Deen, a Panjabi, who rode	92		
A Panjabi Hindu, who walked . .	93		
A Tibetan, who walked	78		

Before reaching camp most of our followers were

complaining of headache, and I found several of the Tibetan porters lying in the road completely prostrated. When asked what was the matter, they placed one hand across the forehead, and with the other plucked up a piece of a strong-scented Artemisia, making signs that this plant was the cause of their suffering. On some of the passes the Artemisia has an overpowering odour, and everything, baggage, horses, and men coming from Yārkand stink of it. We used to think even the mutton had the same flavour. Several travellers have told me that they and their followers suffered more in crossing this pass than on much higher ones. We encamped for the night at a pretty little lake of sweet water, 300 feet below the level of the top of the pass. The unpleasant symptoms, caused by the rarity of the air, did not disappear until the day after, when we reached a much lower altitude. I myself, even at 19,600 feet, have never experienced much discomfort, beyond a little shortness of breath after active exertion, and occasionally awaking during the night with a feeling of suffocation, which usually passed off after a few deep inspirations had been taken. With several of our party the symptoms were very severe, and at times even alarming. There was intense headache and great prostration of mind and body, with constant nausea, and such irritability of the stomach that even a spoonful of cold water could not be retained. Great irritability of temper was another marked symptom, and in some cases the lips became blue; in Mr. Shaw's case a clinical thermometer showed a fall of temperature from one to two degrees, compared with his temperature on previous days. I happened to have amongst my

medicines a quantity of chlorate of potash, and gave a strong solution of it more as a *placebo* than with any belief that it would relieve the symptoms. However, it seemed to have a very good effect, but on what principle it acted I will not venture to conjecture. I have no doubt that the unpleasant effects experienced at great altitudes are very temporary, and, as in the case of sea-sickness, are overcome by practice. They are also most severe on rapidly ascending to a great height.

On the 11th July we marched twelve miles, to Durgu, which is 2000 feet lower than the lake at which we had encamped overnight, and about 500 feet lower than the top of the pass. Here all the headaches and nausea rapidly passed off.

At Durgu we entered a well-cultivated valley, which we followed for two marches (twenty-seven miles) to the Pangong lake. A large stream, fordable with difficulty at this season, flows down the valley and empties itself into the Shyok river, a few miles below Durgu. This stream swarms with fish.

On the 12th July we marched up the valley fifteen miles to Muglib, passing the village of Tanksé about half-way, where cultivation for a time ceases. At Muglib there is good pasturage, but no cultivation.

On the 13th July we marched up the valley twelve miles, passing two small lakes of sweet water, and encamped at Lukung—where there are a few huts and some acres of barley-cultivation—half a mile from the western end of the Pangong lake.

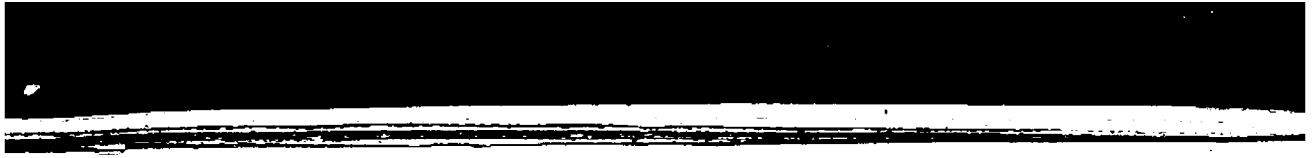
From Lé to Muglib the rocks were chiefly granite, and in many of the valleys there were deposits of clay and gravel of enormous depth, often 300 feet at least.

HELIOTYPE

L. REEVE & Co

CAMP AT LUKUNG, ON THE BANKS OF PANGONG LAKE.

P. 58.



Beyond Muglib I noticed a good deal of white gypsum and slate.

On the 14th July, leaving the Pangong lake, we marched ten miles northwards to Chágra, along a small stream, which swarms with three or four species of fish, varying in length from four to eight inches. So numerous were the fish, that in the course of two hours we caught with a net about two hundredweight of them, to be salted and dried for future use. There is a little very poor cultivation along the banks of the stream, and very good pasturage; but at Chágra, which is about 15,500 feet above the sea, all cultivation ceases. The valley we passed through to-day is wide and shallow, with rounded gravelly hills on either side. It abounds with waterfowl—gulls, terns, and dippers—and in October there were thousands of the Tibetan sand-grouse (*Syrhaptes tibetanus*). Hares (*Lepus tibetanus* of Waterhouse) were also plentiful; not, as might have been expected, in the meadows near the stream, but out in the open gravelly plain, concealed behind stones, where there was hardly a trace of vegetation to be seen. They were also found on the next two marches, and again in the Karakásh valley, about Balakchi.

The Pangong lake, into which the Chágra stream falls, is a very fine sheet of water without any outlet; it is said to be about 100 miles long from east to west, and varies in breadth from two to ten miles—three miles is about the average. The water is remarkably clear, and intensely bitter to the taste; it has a very deep blue colour, like all lakes in these high regions, and this colour is no doubt owing chiefly, if not entirely, to the reflection of the re-

markably clear blue sky from the rippled surface of the lake. The water, when looked through in shallow places on to a white sandy bottom, has, it is true, a light blue or rather greenish colour; but the intense blue which the lake presents from a little distance, does not, I think, depend on the colour of the water itself. The water of this lake, roughly analysed, was found to contain per gallon about 1000 grains of salts.*

With the exception of a small crustacean (probably a *Gammarus*, as Mr. Etheridge, of the Royal School of Mines, informs me) not quite an inch in length, and resembling a small shrimp or sand-hopper, I doubt if there is any animal life in the western portion of the lake. The absence of gulls, terns, and other waterfowl, which were so abundant on the fresh-water rivulets running into the lake, strengthens this opinion. Many feet—in some places seventy feet—above the present surface-level of the water there are white deposits, consisting chiefly of lime, and containing spicula of sponges and fresh water shells. Mr. Etheridge, to whom I showed these shells, says they are all species of *Limnæa*. These old beach marks, and the shells they contain, show that the lake has at one time been much larger and less salt than at present; and before very long it will no doubt become a salt plain, like that which we had to traverse before reaching the Karakásh valley.

In addition to the shells, on the old beach marks, there is evidence to show that a large stream, issuing from the lake, at one time flowed down the Tánksé

* A complete analysis of the water is given in another part of this volume.

valley into the Shyok river. This valley, four miles above Tánksé, is very narrow, and has vertical walls of rock, several hundred feet high, on either side, and very much resembles the Jhelum valley below Báramulla, where a rocky barrier of immense height has been worn through by the Jhelum river.

At Chágra we met an officer returning from a shooting excursion to the Chang Chenmo valley, in search of wild Yak; and who had met with fair success. He was accompanied by his wife, who seemed to stand roughing it wonderfully well. We all dined together, and passed a very pleasant evening.

Some of the nomadic Tibetans, who roam about with their flocks and live in black tents made of Yak's hair, were reported to be encamped a few miles above Chágra; and as I had never seen one of these camps, I went out in search of this, but probably went up the wrong valley, for I failed to find it. Throughout Ladák, but particularly amongst these nomads, there is a very fine breed of large dogs, with long, shaggy hair; they are not unlike the English collie, except that they are of much larger size. They are usually very savage, and are kept for the purpose of protecting the flocks from wild animals. The large droves of sheep which are employed to carry borax from Ladák to the Kulu valley, are always accompanied by several of these dogs; and when a traveller approaches one of the encampments, the women rush out and sit on the heads of the dogs until the traveller has passed clear of the camp. These dogs are rather difficult to obtain, and a good one often fetches about 10*l.*, I believe. They do not thrive on the plains of India, soon losing their long hair, and seldom sur-

viving the second hot season; but I have seen several fine specimens of them in England, which were reported to make first-rate watch-dogs. In the more elevated parts of Ladák every animal has an undercoat of extremely fine hair called "pushmina," and it is this undercoat of the goat from which the Kashmir shawls are made. The pushmina of the ibex is very highly valued, and of course is extremely scarce.

From the Zoji-la pass to Chágra, I have called the Ladák portion of our route, for the country beyond Chágra being desert and uninhabited, can hardly be said to belong to any one; I have therefore distinguished it as the Desert. Before entering this desert I shall make a few remarks on the region we have just passed through.

In consequence of the dryness of the climate, none of the passes along our route, beyond the Zoji-la, are ever rendered absolutely impassable by snow, except, perhaps, the Sánju pass, on an outlying branch of the Kuen Lun, which intercepts all the moisture brought from the plains of Central Asia. The line of perpetual snow in Ladák is probably not under 20,000 feet. On entering Ladák from Kashmir the climate and appearance of the country completely change. The pine-clad mountains and densely wooded valleys are replaced, as we have seen, by an apparently endless succession of barren rocky mountains and valleys, which are almost desert except along the margins of streams. For some distance beyond the top of the Zoji-la we found that the ground was still covered with green turf; and this is owing to the wide and deep depression of the Zoji-la, which allows moisture

to come over from Kashmir. Beyond the Drás valley, to which this influence extends, until we reach the Sánju pass the hills are almost devoid of vegetation, and cultivation is confined to the banks of rivers and the streamlets coming from snowy peaks.

Wherever the mountains rise to about 20,000 feet they are covered with perpetual snow, and this snow, in melting slowly during the day, gives rise to streams, which often become roaring torrents before night but are almost dry again before morning. Every drop of water in many of these streams is used for irrigation up to about 15,000 feet. With the exception of an occasional Pencil Cedar (*Juniperus excelsa*), which was noted as much as thirty feet in height, an Elæagnus, which is rare, and the Sea Buckthorn (*Hippophae rhamnoides*), which seldom attains a height of twenty feet, and is usually under eight feet, almost the only trees met with are such as have been planted near villages or along streams, and these are chiefly willows or poplars. About Kalsi and Nurla, and some other villages on the banks of the Indus, there are orchards of apple, pear, and apricot trees; and in other parts of Ladák which I have not visited, apricots must be very plentiful, for the dried fruit forms an important article of food with the Tibetans.

In the valley of the Indus about Lé, and in a few other localities, the Buckthorn, Tamarisk, and Myricaria form a pretty dense bushy jungle, and the only jungle met with in Ladák.

As already remarked, wherever water for irrigation can be obtained, up to 15,000 feet above the sea, grain crops are grown. Wheat ripens up to 12,000 feet, and barley up to nearly 15,000 feet. Parched barley

flour is eaten by the Tibetans, simply made into a paste with water; and a sheepskin bag of this "satu," as it is called, is almost the only food they take with them on a long journey, and, as might be expected, they suffer dreadfully from indigestion.

Throughout Ladák, barley is used for making a very inferior kind of beer called "chang." The ferment used is said to be brought from a distance, and to be got from some plant, but I failed in obtaining any further information regarding it. The beer is made in a very rough way, and is usually very sour, but after a long march it is not an unpleasant drink; and although very weak, many of the Tibetans drink such quantities of it as to make themselves very jolly. All the Tibetans are passionately fond of tea, which they infuse along with barley flour and dried apricots reduced to powder; when the mixture has been brought to the consistence of a thick soup, a little butter and salt are added. Most Europeans, who have been reduced to such extremities as to be driven to try the mixture, find it very palatable. The summer in Ladák is only about four months in duration, namely, June, July, August, and September. The harvest is gathered in September, and within a very short period winter sets in and all the smaller streams become frozen. The Indus, I believe, does not freeze until after Christmas.

During the long winter, fodder seems to be very difficult to obtain; all the willows about the villages are pollarded, and the leaves, together with all the scanty natural herbage, are dried and stored on the roofs of the houses to feed the cattle in winter.

I believe there is hardly a blade of grass or a green

leaf to be met with from November till the end of May.

A few cloudy days in September often do great damage, by preventing the crops from ripening.

Rain scarcely ever falls in Ladák. I believe it is no exaggeration to say, that the entire rainfall for twelve months would hardly be sufficient to wet one's coat. Captain (now General) Strachey, in the 23rd volume of the Geographical Society's Journal, estimates the total annual amount of rain and snow at about three or four inches. Snow occasionally falls to the depth of six or eight inches at one time, but owing to the excessive dryness of the atmosphere, it usually evaporates in a few hours without perceptibly liquefying.

Perhaps the most striking feature of Ladák is the wonderful clearness of the atmosphere. This is partly owing to its extreme dryness and rarefaction, but chiefly to the entire absence of haze. On the Yārkand plains, with an atmosphere equally dry, we had a dense haze produced by fine dust floating in the air. In Ladák, hills which are fifty miles distant, appear to be within an easy march, and it is remarkable, as I have before stated, that with the thermometer in the shade near the freezing point, it may be a black bulb thermometer placed in the sun will often register as high as 212° F.—*i.e.*, the boiling point of water at the sea level.

On the higher mountain ranges rain or snow falls much more frequently, and in greater quantity than on the low ground, and I have on three occasions seen a slight thunderstorm on the mountains near Lé. Were it not for these elevated mountains, which

attract and store up moisture in the form of snow, and furnish during the summer months a small but constant supply of water, Ladák would be an absolute desert.

V. THE DESERT.

Leaving Chágra on the 15th July, we marched seventeen miles to Páng Lung, crossing the Másimik pass, which is 18,800 feet high. The ascent to the top is long and moderately steep, over undulating ground with loose stones on the surface, and near the top some rugged peaks project above the débris of which the surface of the country is here composed. At several points along the road, where a little grass existed, I saw marks of old Tibetan camps, and at these spots the tailless rat, *Lagomys Curzonia* of Hodgson, was very abundant. Traces of it were afterwards met with almost every day, as long as we were at lower elevations than 18,000 feet, until we reached the Karakásh river. Near the top of the pass I saw in the distance a large bird, probably a Lammergeyer. This was the only large bird I saw in the desert.

The top of the pass was quite free from snow; but some neighbouring peaks, which rose 500 to 1000 feet higher, were white with snow. After crossing the ridge we passed Rimdi, the usual encamping ground, and went on to a place called Páng Lung, where a few sheds had lately been erected to give shelter to traders. Between Rimdi and Páng Lung we entered a narrow valley, the slope of the hills being very steep, and consisting, as in many other parts of Ladák, of loose angular stones, some of which are as much as a cubic yard in size. These seem to

have been detached from the peaks above by the action of the weather, and form enormous slopes, sometimes many thousand feet in height, somewhat resembling a newly-made railway embankment.

On the morning of July 16th, at Páng Lung, the minimum thermometer placed out in the open air all night registered as low as 23° F., or nine degrees below the freezing point.

Our Tibetan camp-followers always slept in the open air, and did not appear to feel the cold. At first I offered some of them the use of a spare tent, but they would not take the trouble to pitch it. They usually built a low wall of stones, in the form of a semicircle, with the concave side looking in the direction opposite to that from which the wind was blowing. The winds in Ladák blow with great regularity up the valleys during the day, and down the valleys during the night. In very open ground I invariably found that the wind was from a south-westerly direction; and when clouds were seen, either in Ladák or Yārkand, they were always moving nearly in the direction from south-west to north-east. Under shelter of the stone walls, which are about four feet high, the Tibetans sleep huddled together; each man in a sitting posture, with his back against the wall, the knees drawn up, and the chin resting on the breast between the knees, in a position which would be extremely uncomfortable to ordinary mortals. These Tibetans, or Bots, as they call themselves (Bodyul, *i.e.* Bodland, is the name they give to Tibet), all wear the hair plaited into a long pigtail behind, and many of them have marked Chinese features. They are all clad in very thick woollen

clothing, with a loose overcoat of sheepskin, having the woolly side towards the person. This great-coat extends to the ankles, and completely covers the feet when the wearer is in the sleeping posture. It has very long sleeves, which extend several inches beyond the tips of the fingers, and keep the hands warm. Although we frequently had the temperature nearly as low as zero, none of these men ever appeared to suffer from the cold. When fuel was to be had they used to make a fire of an evening, and sit round it talking and laughing until past midnight, and when the fuel was done they retired to their stony couches. They are a very dirty race, and scarcely ever change their clothing until it is completely worn out; and most of them are clothed in such a mass of rags, that I doubt if their dress could ever be put on again if once taken off. They are said to be only washed twice—viz., once after they are born, and once again after they die. And, as may be imagined, they are not pleasant companions to be near on the line of march. As a rule they are a very good-natured, jolly set of fellows, and they usually hum a song whilst trudging along with their loads. These they never carry on their heads, as the Indian porters do, but always on their backs, supported by two loops of rope through which the arms are passed, similar to the way in which the soldiers' knapsacks used to be carried. It is not unusual for the Ladák women to act as porters.

Every Ladáki is constantly occupied in curing sheep-skins for clothing. This is done by simply rubbing the skin between the hands, in order to make it soft whilst it is being dried; and the smell from

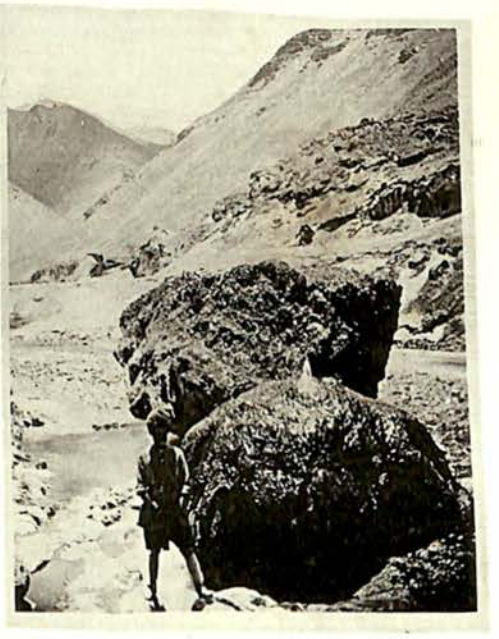
these skins, when a week old, is sometimes quite overpowering. The uncleanly habits of the Bots may possibly have something to do with enabling them to endure cold better than they otherwise could do, and it is certain that they stand, without injury, and apparently without any inconvenience, a degree of cold which would be dangerous to most Europeans. I should mention, however, that when Hayward explored the source of the Yârkand river in December, 1868, he travelled without a tent, and surveyed a very large tract of country with the thermometer as low as 18° F. below zero at night, and only about 5° F. during the day; so that a European of energy and determination may stand the same exposure as these men do, but certainly not without very great suffering. During the whole of our march I never heard the Bots complain, nor was there any sickness amongst them. At Páng Lung we met Bakshi Rám, the native Joint Commissioner of Ladák, who was associated with Dr. Cayley to represent the Maharajah's interests in looking after the trade to and from Central Asia. Bakshi Rám had been educated for the medical profession. He was about 65 years of age, and this being his first year in office, he had gone to inspect the new trade route; but, after going four marches beyond this point, he found the difficulties and privations so great, for a man of his years, that he was obliged to return. In answer to my question, if he had got over the top of the highest pass, he said, "Yes, but four marches beyond this I found it all top!" and this description gives a very good idea of the impression we afterwards formed.

On July 16th we marched twelve miles to Pamtzil, along a desert valley having dark-coloured rocky mountains, on either side, capped with snow. Through this valley a small stream flowed, which in the early morning had ice along its margin. It joined the Chang Chenmo river just below Pamtzil, where we entered the large valley of the Chang Chenmo river, which flows from east to west at right angles to the ravine we had come along. On arriving at Pamtzil we heard from the men of the advance camp that some grass existed two miles down the river, and as our camp was pitched in a jungle of Myricaria and Tamarisk bushes, which afforded excellent fuel, we decided to halt here next day and overhaul our arrangements before plunging into the desert beyond. On the return journey our camels eagerly browsed the bushes in this spot, but I do not think that yaks will eat this foliage. Dr. Cayley, who had marched with us thus far, here left us, and pushed on with a very light camp to explore a new route, so that he did not again rejoin us until we reached the Karakásh valley.

During the halt at Pamtzil, on the 17th July, we inspected all our baggage animals and supplies. These were all under charge of the Wazír of Ladák, Akbar Ali, who, with a Kashmir guard, had accompanied us from Lé, and, as already stated, had promised to stay here until he should get intelligence of our having reached the Karakásh river, so that in the event of a breakdown he might send us assistance. On mustering our pack-horses, it was very evident that hardly one of them was fit for the journey; but as it was impossible to replace them by fresh ones from Ladák without halting for a fortnight, during

which time our stores of food would have been exhausted, and we might have found it impossible to carry out our latest instructions, which were to return at all hazards before winter, we had no help for it but to weed out the worst horses—and they amounted to seventy. We also sent back all superfluous camp followers, and thus reduced as much as possible the size of our camp. Some time afterwards we discovered that after leaving Lé our best horses had been secretly changed by the Ladák officials, whereby their pockets had been filled at our expense. When returning from Yārkand we adopted the plan of branding the hoofs of all our animals, to prevent similar practices. During the halt at Pamtzil, as hares were reported to be plentiful, I went out with my gun; but returned without having seen any animal life. In the evening Mr. Forsyth entertained at dinner our Yārkandi companions, and chairs being deficient, we adopted the oriental custom of sitting on the ground. After dinner we heard a great shouting and excitement in camp, the cause of which turned out to be that the river had risen and was rapidly flooding the camp. By an energetic effort an embankment was soon thrown up, and no damage was done, as the river subsided again very soon. On the 18th July we marched to Gokra, thirteen miles up the Chang Chenmo valley. We forded the river about midway without much difficulty. At Gokra the river flows from west to east, but near the place where we crossed, it takes a bend and flows from east to west so that the Gokra and Pamtzil valleys are nearly parallel to each other. They are separated by lofty and very rugged mountains. Twenty miles above

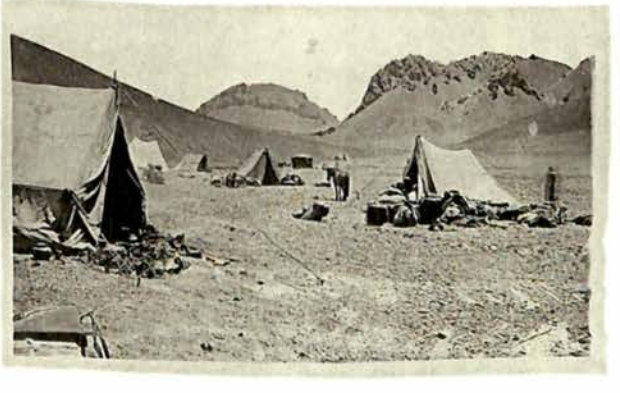
Gokra there is plenty of grass and wild yak are said to be plentiful. Our route, however, lay up a ravine to the north, which, twenty miles from Gokra, leads by several passes on to the tableland of Lingzi Thang. Leaving Gokra on the morning of the 19th, we had difficulty in fording the Chang Chenmo river, which was daily increasing in size. About 9 A.M. the rivers, fed by the melting snow, are at their lowest, and we had to wait until that hour before we could get across. During the delay we inspected all our supplies of grain, and saw sixty yak-loads fairly started on the road. From Gokra we marched up a narrow ravine, which, owing to landslips, was in some places almost impassable for beasts of burden; and, although we had only about fifteen miles to go, it was dark before we got to camp. Eight miles from Gokra some very remarkable hot springs were seen, one of which, in particular, was very curious. From the summit of what appeared to be a huge rounded boulder, about eight feet high, (composed of lime and lying in the bed of the stream,) a jet of hot water, having a temperature of about 150° F., rose to the height of a foot or more. This rock, from which the water issued, although similar in outward appearance to a number of large boulders near it, and to all appearance detached from the ground, was in reality a large stalagmite formed of carbonate of lime, and perhaps partly of silica, deposited by the water of the spring, which, in addition to containing lime, is surcharged with carbonic acid gas, and effervesces like soda-water as it escapes into the air. There are numerous other warm springs in the vicinity, which I found to have a temperature of about



HELIOTYPE L. REEVE & Co

HOT SPRINGS ABOVE GOKRA.

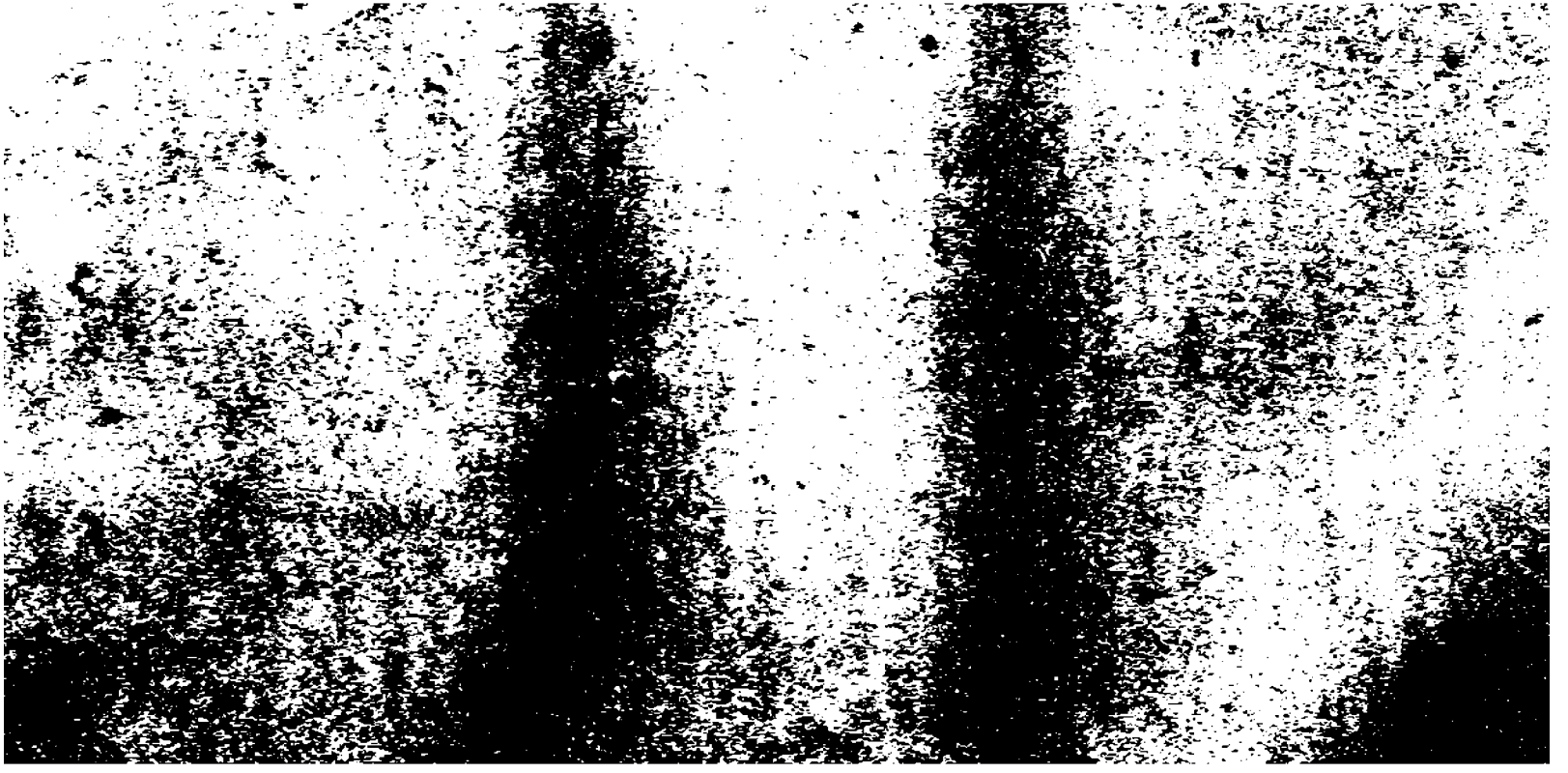
P. 72.



HELIOTYPE L. REEVE & Co

CAMP AT LAK ZUNG, 18000 FEET ABOVE THE SEA.

P. 78.



90° F. All the ground round about is covered with saline efflorescence. The whole valley near the springs has a strong smell, like that of decaying seaweed. Near the springs I shot some plovers and a Brahminy duck (*Casarca rutila*). In October, several teal were observed here. I collected quantities of algæ at the hot springs, some of which are new; but with the exception of "Burtsi" (*Eurotia*), stunted *Ephedra*, *Artemisia*, and a *Carex*, which last, for the next ten days, was to do duty for grass as food for our animals, almost no flowering plants were seen. I do not know why "Burtsi" should be called "wild lavender" or the "lavender plant" by all Europeans who travel in these regions, unless it has been mistaken for a species of *Perowskia*, which is common lower down in Ladák, and does somewhat resemble lavender when in flower. We now found it difficult at times to keep to the proper route, for the valleys all looked very similar to one another. We were greatly assisted by small piles of stones, erected at every quarter of a mile or so by Dr. Cayley's men, who had preceded us. This is the way in which the route is usually marked out in these parts. Every traveller, when he comes to a point where the valley branches, erects a few piles of stones to show future travellers the route he has taken. At the place where we halted for the night, grass was said to exist, but it was some time before the uninitiated eye could discover anything deserving the name of grass, each plant of sedge (*Carex moorcroftii*) having only half a dozen leaves, more like bristles than anything else, and being separated from its next neighbour by a bare space of several feet. Few of our yaks with grain came up,

and a report was brought that they had been halted at a grassy spot to graze all night.

On July 30th we started at 6 A.M. to cross a pass to Gnischu, sixteen miles distant. On starting, the thermometer was at 13° F. The ascent was very gradual and easy, except for two miles near the top. All the rocks in this ravine, from Gokra to the pass, consisted of slate, gneiss, and mica schist, except near the hot springs, where some fossiliferous limestone was seen. In many places the strata are very much contorted. This pass, a new and easy one, having been discovered by Dr. Cayley, we afterwards distinguished by the name of "Cayley's Pass;" it is to the east of that taken by Messrs. Shaw and Hayward. Its altitude above the sea was ascertained by the mercurial barometer to be about 19,600 feet, yet there was no snow on the pass itself, and very little on the hills near it. After crossing, we found a few patches of snow in shady spots on the north side.

Strange as it may appear, I saw several butterflies* near the highest point, although there was no vegetation. We encamped six miles from the top of the pass, and 800 feet lower down, at the junction of two streams, the place being hence called Gnischu or Gnichu (*gni*, two, and *chu*, water—Tibetan). Our camp was pitched close to one of the streams, so that we were well off for water, but there was absolutely no fuel, no grass, nor vegetation of any kind; and with the exception of some ravens, which had followed us from Lé, no animal life was seen. Next morning we began to get alarmed about our supplies. It was a remark-

* A note by Mr. Bates on this species of butterfly will be found in another page.

able circumstance that although every load of baggage had arrived in safety, none of the yaks carrying the grain had as yet turned up. Messengers were sent back to the Wazír, urging him to forward the grain; but with the exception of five loads which came up next day, we never again saw the remainder. It was afterwards proved that the Wazír was aware that our grain was being kept back; in fact, instead of sending us help, he hurried back to Lé, and when our letters ultimately reached him he excused himself from rendering assistance on account of the distance. We were now placed in a dilemma; we could not halt even for a day at Gnischu for want of fuel and fodder, the small supply of fuel we had brought with us was almost all consumed the first evening in cooking our dinner, and there was barely sufficient remaining in the morning to heat water for our tea.

To retrace our steps was to give up the expedition, our baggage animals being already almost exhausted, and three had actually died before morning from the combined effects of starvation and cold, the thermometer during the night having fallen to 10° F. If we proceeded we should have one day without grass, but at the end of the second day we *hoped* to find grass, if no fall of snow should occur to conceal it. It was therefore decided to push on.

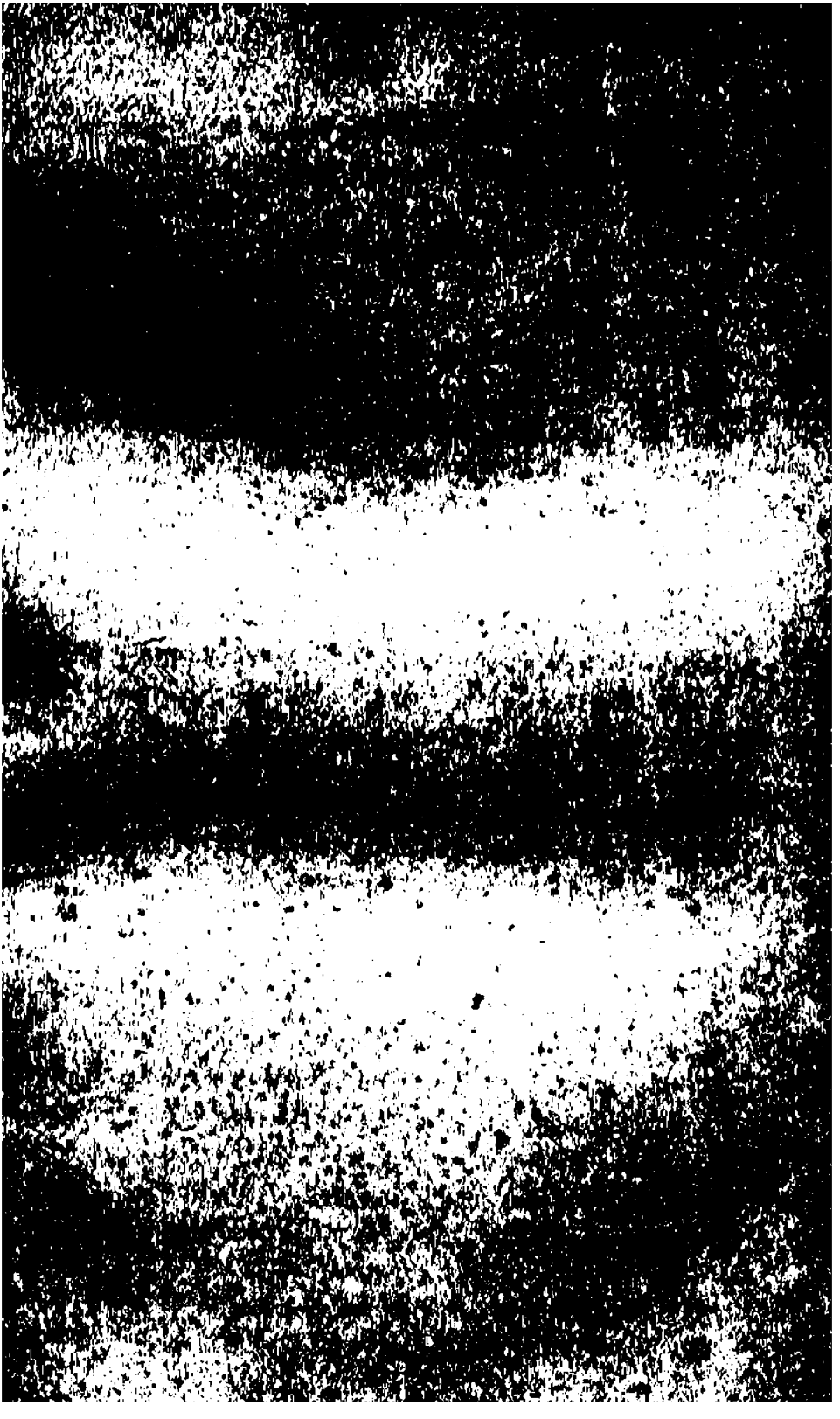
Gnischu was the highest point at which we encamped for a night, the mercurial barometer being at 15·23, and water boiling at 180° F.; showing that the altitude above the sea is about 18,850 feet. The temperature of radiation at night was 10° F., and in my tent 32° F. Our servants found it impossible to

cook pulse, and the tea required to be actually boiled for some time instead of being only infused.

Fires burn at this altitude precisely as they do at the sea-level, and although my attention was directed to the flame of the candle, any alteration in its appearance was not very marked, neither was there any very marked difference in the report of a gun; but in this case and in that of the candle-flame it is difficult, without very carefully performed experiments, which I did not make, to ascertain and measure the effects produced by elevation above the sea. The ravens and butterflies seemed to fly with quite as much vigour as at lower altitudes.

Leaving Gnischu on the 21st July, we marched eighteen miles and encamped on the Lingzi Thang plains. At first we followed the course of the stream through a wide valley which ended about six miles from Gnischu, and we then emerged from the low rounded hills on to the open plain of Lingzi Thang, and made towards a dome-shaped peak thirty miles to the north, but to all appearance not above ten miles distant, so clear was the atmosphere. The stream which we had followed from Gnischu turned to the left on leaving the hills, and is said to end in a lake some miles to the eastward.

When we left the stream there were some fossiliferous limestone rocks, my specimens of which I afterwards lost. We then travelled over a bare desert plain of shingle for three miles, when we came to an abrupt descent of about 100 feet, and from the brink of this the view was very remarkable. The desert plain extended in every direction for at least twenty miles, and the horizon was bounded by snowy



HELIOTYPE

L. REEVE & Co

CAMP AT LINGZI THANG, 18,500 FEET ABOVE THE SEA.

P. 77.

peaks of the most fantastic shapes. The plain itself, from the effects of mirage, appeared to be covered with forests, fields of waving corn, and studded with villages and towns, and here and there an extensive sheet of water. So very deceptive were the appearances that I heard our camp followers congratulating each other on having got over the desert.

Of course the lakes and everything else disappeared as we advanced, and the plain was found to be a level waste of sand mixed with angular fragments of gneiss, slate, sandstone, and limestone. We encamped on this plain at an altitude of about 17,300 feet, in what appeared to be the dry bed of a stream. We obtained plenty of water by digging holes in the sand, and there being no grass, our horses and sheep began to browse the "Burtsi" plant, which grew here rather sparingly; but after a few days of this food the flesh of the sheep we killed was almost uneatable. I noticed here what appeared to be a large flock of plover, but failed to secure a specimen. Antelopes were also reported to have been seen by some of our camp followers. With these exceptions no animal life was seen. We now experienced great discomfort from the high wind, which almost every day begins to blow from the west or south-west about 10 A.M.; it increases to a hurricane towards the afternoon, then gradually subsides, and by midnight the air is again still.

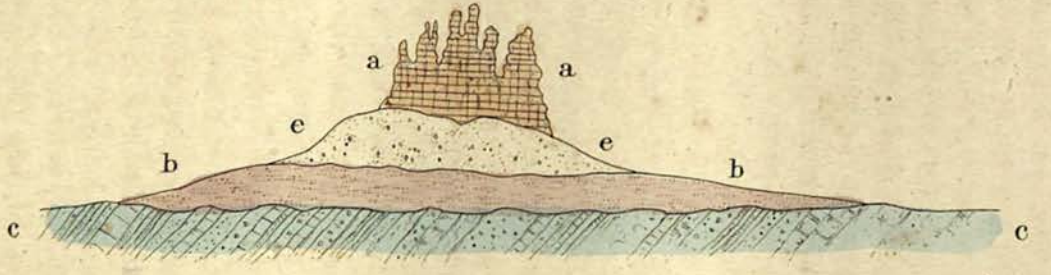
Travellers have not unfrequently been killed by this wind, which at times is so cold as to destroy vitality in a very short time. Both men and horses now suffered greatly from the rarity of the air. Some of our men lay down on the open plain, com-

pletely exhausted, and did not reach camp until next day; some of our horses which broke down had to be abandoned and left to their fate.

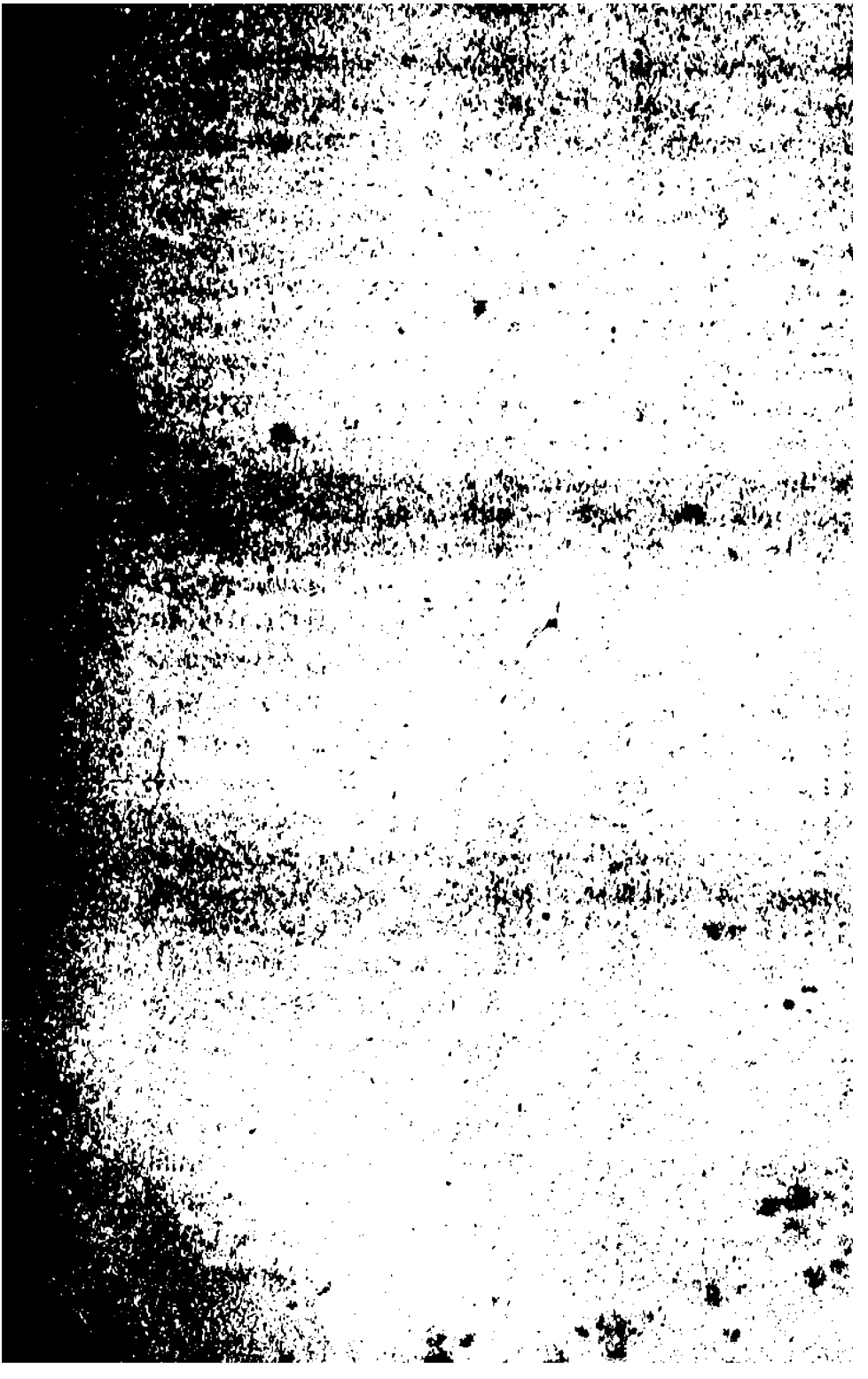
On July 22nd we marched twenty-five miles northwards to Lak Zung, keeping towards the dome-shaped peak, which we passed, and entered a winding valley with rugged precipitous rocks on either side. On a solitary rock, about 200 feet high, I saw the remains of an enormous nest, probably of some raptorial bird, for the ground underneath was strewn with fragments of bone, &c. &c.

A herd of antelopes was seen by some of our party who were in advance of the rest. The hills near Lak Zung had all the appearance of ruined castles, and some of them were of the most extraordinary shapes. In many places the ground was strewn with fragments of limestone containing fossils. I collected a number of specimens, which were afterwards lost, but Mr. F. Drew informs me that the fossils are chiefly encrinites and hippurites.

A section of one of the hills would present something of the appearance shown in the accompanying diagram. There are two distinct strata containing the fossils; the lower and older, "*c*," is a dark grey or sometimes blue limestone, sometimes flaky; the upper and newer is a lighter-coloured limestone, sometimes white, sometimes drab, and sometimes light grey; this limestone has occasionally a reddish-brown tint on the outside from oxidation, but when broken it shows the above colours. The upper limestone, "*a*," is of younger or different age, and this is determined by the interposition of red-sandstone horizontal beds, "*b*," which



a. *Upper Limestone.* | c. *Lower Limestone.*
b. *Red Sandstone.* | e. *Talus.*



rest "unconformably" upon highly inclined beds of limestone, "c," and the upper limestone also rests "unconformably" upon the red or ferruginous sandstone.

At Lak Zung we found water, some grass, and a little fuel, and as both men and animals were now thoroughly exhausted, many of them not reaching camp until midnight and a few not until next day, we found it absolutely necessary to halt here on the 23rd and 24th July; which two days were occupied in sending out our horses to graze, and in collecting all the grass we could get, to take on with us to next camp. All hope of assistance from the Wazír was now given up. We were at least 100 miles from any help, and we had barely enough provisions to keep our men alive until we should reach the Karakásh valley. Our horses, moreover, were reduced to such a state that they used to turn over the baggage during the night in search of bags of grain, and I have seen them, on finding one of the bags, tear it to fragments with their teeth and hoofs in order to get at the contents. Their allowance of grain was reduced to from one to two pounds a day.

As many of the horses had been left to perish on the road, and many of those remaining were totally unfit to carry loads, Mr. Forsyth determined to select a few of the best and leave all the rest behind, with as much of the baggage as could be spared. The Mír Sahib and Mallik Kutub Deen were therefore supplied with provisions and ordered to remain with the camp we were to leave behind, until the assistance we had been daily writing for should arrive from Ladák. About a week after our departure this

assistance arrived, and they followed us to Shâhidulla. The Yārkand envoy and Kázi Mahomed Yakub were in the same plight as ourselves, and, leaving most of their baggage and their ladies behind, they started off to go by double marches to Shâhidulla, whence they were to send us assistance. Tára Singh and his party, who had gone on before from Kashmir, now rejoined us. They had been to Shâhidulla and had seen some Yārkand soldiers and Kirghiz, from whom they had learned that perfect peace reigned in Yārkand.

There are many observations I regret much that I did not make whilst we were in this elevated region, and one of them is the change produced on the pulse, the respiration, and the temperature of the body. My travelling companions most kindly offered to submit to the torture of having their temperatures taken and pulses counted systematically, but I felt that I had already too many irons in the fire. The few detached observations I did make are not of much value, but they proved clearly that, in my own case at least, altitude had very little effect, as the following figures will show. I may mention that numerous observations made on my companions gave similar results.

Place.	Date.	Pulse.	Respiration.	Temperature under Tongue.
Usually		80 ...	24 ...	98·2
Sakte,* 12,900 feet, July 9, 3½ P.M. .		90 ...	25 ...	93·3
Top of Chang-lá, 18,000 feet, July 10th, after walking to top		80 ...	26 ...	—
Lak Zung,† 17,500 feet, July 24, 7 A.M.		75 ...	24 ...	97·8

On the morning of the 25th July we prepared for

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* After sitting quietly in my tent reading and writing for several hours.

† After slowly dressing.

a march of fifteen miles to Tarl Dat, but to our dismay found that twenty-five of our best horses, which had been placed in charge of a Ladák official, were missing, and we had good reason to believe that they had been intentionally concealed. They were afterwards found in a ravine at some distance. I should mention that all our ponies were invariably turned loose on arriving in camp, and at once scampered off in search of grass. They seemed to feel the cold at night very much, and often tried to come inside our tents. Several times I have been awakened by finding some dark object in my tent, which turned out to be one of the horses that had managed to get all but his hind quarters into the tent. Towards morning they seemed to try to keep themselves warm by racing backwards and forwards amongst the tents. At Lak Zung the thermometer, placed out in the open, fell at night to 7° F. After some delay in searching for the missing horses we at last started. A low pass being crossed, our road continued through a broad winding valley, with rounded hills on either side, the limestone rocks here and there projecting along the highest ridges. Sedums and Artemisias in flower were common wherever a little moisture existed; and I saw hundreds of white and blue butterflies. Here I noticed a very remarkable appearance, about which I shall have more to say afterwards. For miles the surface of the ground was indented with circular pits, from six to eight feet in diameter and about three feet deep, the centre of each pit being the deepest part. The intervals between the pits did not measure more than the diameter of the pits themselves. Usually these pits were extremely uniform in size and regular in shape. The

soil was clay, with sand and gravel on the surface, and there was no sign of moisture nor saline efflorescence anywhere near. In the upper part of this valley, however, and in all its branches, there were water-channels, which were now dry, but are no doubt frequently filled with water; for their beds were moist, and Sedums were growing there in great luxuriance. The pits were confined to the level part of the valley. Similar pits were afterwards seen in marshy ground along the sides of the Karakásh valley; but in that locality the bottom of each pit contained brine, occasionally incrusted with common salt, which our followers collected for use.

On arriving at Tarl Dat, at the end of to-day's march, I saw more of these circular depressions, from some of which projected a mound of dried frothy mud; these had the appearance of mud volcanoes which had dried up. Tára Singh, who had been here before, told me that after rain these pits frothed like yeast. The view from Tarl Dat was exceedingly grand. The Kuen Lun range, tipped with snow, and the valleys filled with glaciers, extended like a wall across the northern horizon thirty to forty miles distant, and between us and these mountains was an open plain covered for miles by an ice-bed: this ice-bed seems to be fed by some warm springs near the place where our camp was pitched.

Although our point of view was about 16,500 feet above the sea, the Kuen Lun range seemed quite as lofty as do the Himalayas, when viewed from the same distance on the Panjáb plains, and many of the peaks cannot be less than 24,000 feet high. Some of the high peaks seemed to smoke; and at first I thought

this might be caused by snow blown from them by the wind, but later in the day almost all the peaks presented this appearance, and I believe it was chiefly owing to clouds forming on them.

On the 26th July we marched seventeen miles to Patsalung, and finding a little grass we halted next day to recruit our surviving horses, for many had been abandoned, and our riding horses had now to be pressed into the service to carry loads.

On the 28th July we marched fifteen miles to Lung Dung, nearly ten miles of the way being over a plain about five miles wide, which was covered to a depth of many feet (in one place where cracks existed to not less than twenty feet) with sulphate of magnesia* (Epsom salts), pure and white as newly-fallen snow. It caused a glare which was most painful to the eyes, and irritated the face and hands; for the cold winds had taken nearly all the skin off our hands and faces, and the only way in which we could travel in any comfort when the wind was blowing was to have a cloth over the face with holes cut out for the eyes and mouth, and long sleeves to protect the hands. On the surface of the plain the salt had effloresced and become an impalpable powder, which rose in clouds as the horses waded through it, sometimes up to the knees. Underneath it was hard and crystalline, and crackled under the horses' feet. At intervals, probably where springs existed, there were lakes of strong brine, on which I observed numbers of the Ruddy Shieldrake (*Casarca rutila*) and plover. For-

* Dr. Frankland has examined a specimen of this salt, and finds that it is pure sulphate of magnesia, without a trace of any other salt.

tunately, we got over this plain before the wind rose, for later in the day clouds of salt were raised by the breeze, and we saw the remains of a former caravan which had probably been destroyed in this way. This salt plain illustrated very well the mode in which rock-salt may have been deposited, and I have no doubt, that before a very great lapse of time, this salt plain will be buried by blown sand and entirely concealed from view.

At the end of the salt plain we encamped for the night in a valley, where we found some grass and where we got a little water by digging in what appeared the dry bed of a stream, and next morning we marched twenty-one miles and encamped on the banks of the Karakásh river. At first our route was down a gorge, which led from the end of the salt plain towards the Karakásh valley, and was evidently the bed of a former torrent that probably at one time drained a lake, the remains of which have now dried up and left the deposit of salt. We entered the Karakásh valley ten miles from camp, but had to march ten miles farther before we found grass and fuel. The main stream of the Karakásh joins this valley at right angles about four miles below where we entered it, and has there an altitude above the sea of about 15,600 feet. On either side rugged peaks of granite rose to more than 20,000 feet. The numerous spurs which projected into the valley were composed of gneiss and slate, generally much contorted, and there were enormous accumulations of boulders at the openings of all the side valleys. Where we encamped, the main valley was about a mile wide, and there was quite a forest of Myricaria bushes and plenty of good grass.

Dr. Cayley here rejoined us, being encamped three miles lower down the stream. Near the camp we saw a herd of kyang (wild donkeys), and the Yārkandi ladies at once set off on horseback in pursuit, with all their attendants scampering after them.

We had now got over the desert part of our journey, which was by far the most trying.

From the fact that long-sounding names have been given to all the halting-places between Ladāk and Yārkand, and that they are marked on all maps, one is apt to suppose that there is at least a hut or other sign by which these places can be recognised; but nothing exists to mark these places except the remains of fires made by previous travellers, and sometimes the semi-circular stone walls built by the Tibetans for shelter.

We were fortunate in having no snow in the desert, for a fall of even an inch of snow completely conceals the little patches of grass, and a heavy fall renders it difficult or impossible to find the fuel plants. The *Eurotia*, on which we had chiefly to depend for fuel, grows in dense tufts six inches to a foot in diameter, and rises about four inches above the ground. Each tuft, when dug up, is found to consist of a single plant with woody roots several feet long, and sometimes as much as six inches in girth. Besides the Eurotia there is another plant sometimes met with—the *Arenaria musciformis*—which affects shady ravines. It resembles in general appearance an enormous moss, and grows in hemispherical masses of from one to two feet in diameter. This also has a thick woody root, and the whole plant makes tolerably good fuel, but has a most fetid smell when burning. There is great diversity of opinion as to whether horses or yaks are preferable baggage

animals for crossing this desert. Yaks stand the cold better, and are more enduring than horses, but they will not eat grain, probably because they have never been taught. And unless grass is met with and halts are made every second or third march, the yaks become exhausted and die on the road. Once an exhausted yak lies down he seldom rises again. Horses, on the other hand, are almost independent of grass if sufficient grain can be carried, but even under the most favourable circumstances it is always advisable to have a number of spare horses. It is also necessary to take a large supply of shoes and nails, and to have with the camp a man who can shoe horses. This is another disadvantage of yaks, for they are very difficult to shoe, and when once they get footsore they must be abandoned. On the return journey we brought two Bactrian camels the whole way from Yārkand to the Panjáb, and they stood the journey remarkably well. Near Yārkand we met a trader with a number of laden camels, and on our return to Lé we again saw these same camels after they had completed the journey: they were all in excellent condition, and seemed to have stood the work remarkably well.

VI. HILL YARKAND.

HEAD OF THE LOWER KARAKASH TO SANJU.

The Karakásh river takes its rise about fifty miles to the west of where we had encamped on July 21st, on the Lingzi Thang plains. It then flows through a desert valley, with very rugged mountains on either side, for about a hundred miles in a northerly direction, to a point five miles above where we were now encamped. This first part of the river, which

passes through several snow-beds, or frozen lakes, is called the Upper Karakásh. Just above our present camp it turns round at a right angle and flows nearly due west for seventy miles to near Sháhidulla; it then flows north for about thirty miles, and ultimately turns east or north-east to Khoten, but the last part of its course has not been explored. The altitude of the Karakásh above the sea level, where we joined it, is about 15,600 feet.

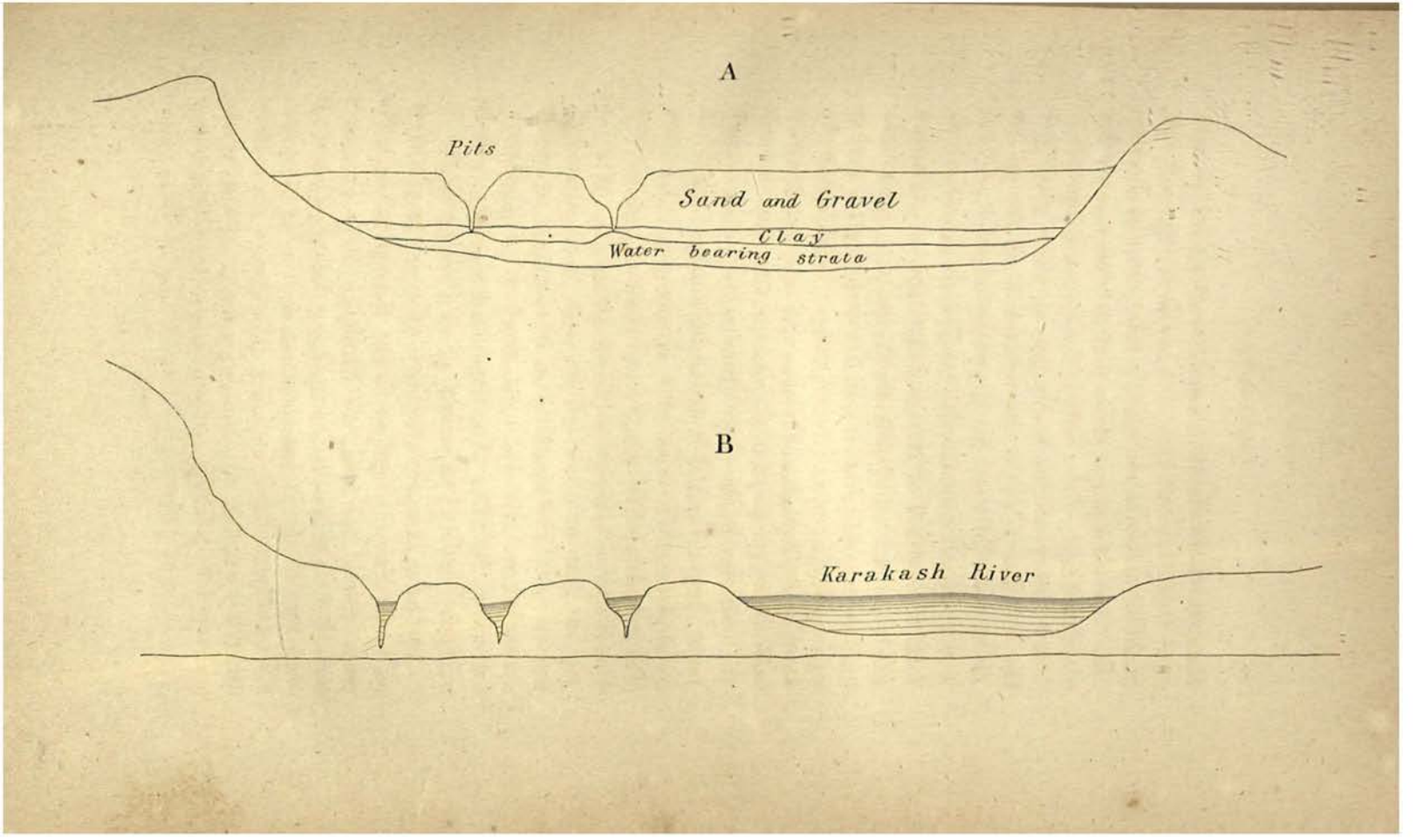
On the 30th July we made a short march of only three miles. A complete halt of even one day has a most demoralizing effect on one's camp followers, as they manage to get everything out of its place, so that on starting again after a halt it requires more than double the usual time to strike the tents and pack up the baggage. At the new camp there was plenty of grass and fuel. The Karakásh valley here varies from one to two miles in width, and the river flows over shingle, in a great number of streams, and winds a good deal, owing to the number of rocky spurs which project into the valley. Here and there the ground is covered with much saline efflorescence, and there are numerous springs, some of which are warm, along the foot of the ranges which rise abruptly and sometimes precipitously on either side. All the higher peaks appeared to be composed of granite, the lower ones of gneiss and slate.

In the shallow side streams and the pools fed by springs there were numbers of small fish, but I never observed any fish in the main stream. To-day I got from Dr. Cayley my first specimens of the Tibetan sand grouse, *Syrhaptes tibetanus*, which had been shot a few days before in the Upper Karakásh valley. I again noticed, in the marshy ground along the river,

the curious circular depressions, similar to those seen near Tarl Dat, but here they were mostly half full of brine, and some contained a thick crust of common salt. In some places these pits covered many acres of ground.

My theory of the formation of these pits, and the only one which seems to explain all the phenomena, is as follows. In the valley above Tarl Dat, I suppose that under the sand and gravel which form the surface of the ground, there is a stratum of clay, under which the water from the mountains finds its way (diagram A), and that the water, flowing in very varying quantity at different times, eats away this layer of clay, and causes the surface above to subside as the sand is allowed to flow out through the openings in the clay. Similar depressions, on a much larger scale, but fewer in number, are often produced in the same way in many parts of the Panjáb, about Amballa, for instance, and about midway between Jhelum and Rawil Pindi. When a fall of rain or snow occurs after dry weather, I suppose that the air and mud in the spaces formerly excavated by the water get churned up into froth, and near Tarl Dát this frothy mud gets forced up and produces the appearance of mud volcanoes.

The brine pits, situated with reference to the river as in diagram B, are no doubt formed in the same manner, and then as the Karakásh river attains a certain height from the melting of the snow, it partially fills the pits with water, and as it ebbs and flows every twenty-four hours, the pits are alternately filled and emptied of water every day, and this water on evaporating leaves salt—for the water of the Kara-


A
Pits
Sand and Gravel
Clay
Water bearing strata
B
Karakash River

kásh river contains salt—and the whole valley abounds in saline efflorescence.*

Next morning, July 31st, we marched seventeen miles down the stream. At 1 p.m. the thermometer, under an awning, was at 66° F., and a minimum self-registering thermometer, placed in the open all night, fell to 25° F., but there was hardly any ice on the water. When returning along the Upper Karakásh, in September, it was remarkable that the river was never completely frozen, although the thermometer was every night nearly at zero, and during the day was never above the freezing point in the shade.

The Karakásh, in the parts where it flowed in a single stream, was seldom less than thirty to forty yards wide and was fordable pretty easily early in the day. I tried roughly to estimate the rate of the current, by throwing in pieces of stick and finding the time these took to float a measured distance. The average of a great many trials gave three to three and a half miles an hour as the rate of flow; and this is probably nearly the rate for fifty miles. The river rapidly increased in size as we proceeded, owing to the number of large streams which join it, and after to-day we always had some little difficulty in fording it, even at 10 a.m. at the widest parts. By the middle of September, when we returned, it had fallen so much as to be easily fordable everywhere. The lower Karakásh skirts the southern base of the Kuen Lun range, the higher peaks of which rise to over 24,000 feet. They are covered with perpetual snow

* Mr. Shaw informs me that in winter the water of the Karakásh river is like brine, and quite undrinkable.

and have glaciers in their valleys. On the south side of the valley there is another range, or series of ranges, of mountains less lofty and less regular than those on the north, and the main stream is fed by numerous tributaries which join it on either side at short intervals of two to four miles. In some places the river expands into a lake, and in these we saw numerous broods of the Ruddy Shieldrake barely able to fly. These birds seem to breed only where there are precipitous rocks rising from the water. In all the marshy ground plovers were common. Patches of grass and Tamarisk-jungle were met with at short intervals, and in many places Sedums, Clematis, and a beautiful yellow *Statice* were in great abundance. One of the most common plants was a wild onion, *A. junceum*, the leaves of which, when cooked, turned out to be excellent eating.

On the morning of the 1st August the minimum thermometer, in the open all night, had only fallen to 30° F. To-day we marched fifteen miles, and had time to ford the river, which was effected with some difficulty. The heat at midday now became rather oppressive—85° F. at 2 p.m., under an awning—and we were annoyed by myriads of insects, some of which were so minute as to be almost invisible to the naked eye; they settled in clouds on the hands and face, and caused us great discomfort. I heard the chough calling, but as I never succeeded in getting a specimen in Yārkand, I do not know if it was the same species we met with in Ladák. I shot a hare to-day, of the same species as those obtained at Chágra, and after this hares were seen every day we remained in this valley.

August 12.—The minimum thermometer fell during

the night to 28° F. To-day we marched twelve miles, keeping the right bank of the river the whole way. On arriving in camp we heard that some Kirghiz were approaching, and very soon two of these people visited our tents; manifesting great delight at renewing their acquaintance with Mr. Shaw. They had been sent back from Balakchi, two marches beyond this, by Mírza Shádi, and had brought several yak-loads of grain, which was most acceptable to us, for our store was all but expended and our horses were dying in numbers. These Kirghiz might be taken as typical specimens of their tribe. They were almost as fair in complexion as Europeans, and had rosy cheeks. They were remarkably clean in their persons and clothing; the latter consisting of a neat sheepskin cap, with fur inside (the edge of the cap being turned up all round so as to show the fur), and a loose robe of coarse cotton cloth, sometimes lined with sheepskin or padded with cotton-wool, which was fastened round the waist by a belt. The belt answered all the purposes of pockets, having dependent from it a sheath-knife, flint and steel, Chinese perforated copper money on a string, a powder-horn, bullet-mould, bullets, and all the other requisites for a sportsman. We afterwards saw their fire-arms, which are short poly-grooved rifles, all match-locks, with a very small bore about the size of a pea; although plain, they have a very neat appearance. I never saw a flint-lock in Yārkand. For the next few days Mr. Shaw's tent was the rendezvous for the Kirghiz; he was able to converse with them tolerably well. They talk Turki with a very guttural accent. The teapot was in constant requisition to entertain them; and every man on entering or leaving the tent stroked his beard, or

rather his chin, for, as a rule, the Kirghiz have no beards. This motion of stroking the beard was always accompanied by the exclamation, "Allā ho Akbar!" (God is great).

The Yārkand Kirghiz being under the Atalik Ghazi are now compelled to be outwardly very strict Mahomedans. They live chiefly on animal food, the produce of their flocks. I received from one of them a present of cheese, which was in the form of round pellets the size of grapeshot. All their grain is brought from the plains of Yārkand, for they never cultivate the soil. I remarked that none of them used tobacco in any form. I had brought with me a number of clasp-knives and other presents, to give them in exchange for curiosities and articles of dress, but the only thing, except ammunition and looking-glasses, which they seemed to care about was silver coin. One of them returned me a clasp-knife, and said he would prefer any silver coin instead. Possibly the reason of this was that they were afraid the Atalik Ghazi might punish them for taking presents from his guests.

On August 3rd we marched twelve miles to a place called Gulbasha, or Gulbashem, where there was a ziārat or mazār (*i.e.*, tomb) of some saint, on the top of a low hill. We afterwards saw numbers of these mazars. They usually consist of a pile of stones, stuck all over with long sticks and brushwood, on which are bits of rag of various colours.

We saw to-day footprints of a fox (?), and a number of Yārkand ravens, which latter seemed smaller than the Ladák ones, but perhaps they were only less well fed.

HELIOTYPE L. REEVE & Co

GROUP OF KIRGHIZ.

P. 91.

HELIOTYPE L. REEVE & Co

FRONTIER FORT OF SHAHIDULLA.

P. 98.

To-day I saw a horse belonging to the Yārkandis drop exhausted on the road, and as he seemed unlikely to recover, the owner at once cut his throat, to render the flesh eatable by any true believer who might follow us: the Yārkandis eat horseflesh. Pieces of the skin were taken off to repair shoes, and then a number of slices of the best meat were cut out and stuck on the bushes near, to allow them to dry, and thus be preserved for future travellers. Along the road from Lé to Yārkand we saw numbers of dead yaks and horses, completely mummified, for the excessively dry air in such a cold climate produces desiccation before putrefaction has advanced very far. We saw no vultures, and only once noticed what appeared to be the footprints of a fox or jackal. Most of the carcases strewn along the route had evidently not been touched by any wild animals.

On August 4th we marched twelve miles to Balakchi. The thermometer last night did not fall lower than 44° F., and for several days rose to 70° F. under an awning during the day.

We had to ford the river soon after starting. This was a matter of considerable difficulty, not only on account of the depth of the water and force of the current, but from the existence of quicksands. These are common along the whole course of the river, and on seven occasions my horse sank in one of them up to the girths of the saddle, in places where the water was only a foot deep. More of the Kirghiz, with a drove of yaks, met us to-day. They all came up and shook hands with us in the most familiar and affectionate manner, stroking their beards and repeating, "Allā ho Akbar!" They stopped all our baggage

animals, and insisted on putting the loads on their own yaks. These were the finest animals of the kind I had yet seen. They were not unlike the shaggy, long-horned cattle of the Scotch Highlands, but were much more strongly built. They have, as a rule, enormous horns, which, as Mr. Blyth has pointed out to me, have a different curve from those of the wild yak, but which in other respects they exactly resemble. I never remarked the difference in the horns myself, and do not know if it actually exists in all cases. A very few want horns entirely. The usual colour is black, but some are white or light brown. The hair is so long, particularly on the hind-quarters, that it almost touches the ground. The wild yak is almost always found, I believe, just under the snow line, and the tame yak is seldom employed below 12,000 feet. Yaks are wonderfully sure-footed, and will carry one safely over the most rugged and difficult ground. They are very good at fording streams, for, in addition to being very sure-footed, they swim well, and even if carried off their legs by the stream, they recover themselves the moment their feet again touch the rocks.

We passed to-day an extensive jade mine which until a few years ago was worked by the Chinese, but is now given up. All the ground in the neighbourhood is strewn with fragments of jade, and everything inside the mine is precisely in the same state as when the Chinese abandoned it. Dr. Cayley, who carefully inspected this mine, has given a very interesting account of it in "Macmillan's Magazine" for October, 1871. On arrival at Balakchi, we found that Mírza Shádi had pitched one of his tents for us at some distance from his own camp, and shortly

after arrival we got a message from him that the Kázi Sahib and he were coming to call on us and bring a dastarkhan—a thing we had heard a great deal about, but never till now had seen: the word means literally tablecloth, I believe, but has come to mean a feast. Mírza Shádi's dastarkhan consisted of sweetmeats, loaves of Russian white sugar made from beetroot, fruit of various sorts, melons, grapes, peaches, and bread and biscuits. All these good things had been sent from Sánju or Guma. The Kázi Sahib and Mírza bade us welcome to their country, and told us that the King was near Kashgár and most anxious to see us. They said that a letter had just arrived which stated that the King had for several months been engaged in war near Urmchi, and having conquered all the country between that and Kulja, had appointed Turra Khoja ruler of Kulja and Kalmakistan; and, further, that he was on his way to Kashgár with 1000 prisoners of war and a great deal of booty, and that perfect peace now existed.

It was impossible to test the truth of this intelligence, for none of the traders had yet come over from Yārkand. It seemed, however, to account satisfactorily for the rumours of war which reached us in Kashmir, but it was remarkable that Tára Singh had learned nothing of this at Sháhidulla, and we knew that a messenger named Mulla Báki had come from Yārkand whilst we were at Lé, bringing news to the envoy, so that it was incredible that Mírza Shádi should have only now for the first time received intelligence of the King's movements. The Karakoram route from Lé to Yārkand joins the Chang Chenmo route between Balakchi and Sháhidulla, and in a few days we might

expect to meet traders on their way from Yārkand to Lé; but it was impossible to halt for farther information, entirely dependent as we were on the Yārkandis for our daily supplies, which were very limited, and we were still seven days' march from Sánju, the nearest point where fresh supplies could be got.

We obtained through Mírza Shádi provisions for our Ladák porters, who were all paid off here, and returned to their homes, except half a dozen of them who were to go on to Yārkand. These six, however, requested permission to return also, as they had heard that smallpox, of which they have a great dread, was prevalent in Yārkand, and it appeared that none of them had been vaccinated; but as their services could not be spared, they asked leave to go back twenty miles to exhume the body of one of their countrymen who had died a year or two before, as they wished to be vaccinated from the dead body!

Dr. Cayley left us here to return by a new route. Now that we approached Yārkand, Mírza Shádi gave up smoking cigars, as it is not considered in Yārkand the correct thing to smoke: most of the Yārkandis smoke on the sly, however. The Mírza, therefore, took to snuffing, which is almost universal amongst his countrymen. The snuff is carried in bottles, which are usually made of jade, and a pinch of snuff, instead of being taken up the nostrils, is put on the tongue. The Kázi Sahib still continued to indulge in cigars, and expressed great regret that such strict notions regarding religious observance should prevail in Yārkand. He said that the freedom in Constantinople was charming.

Our baggage was now to be carried by the yaks

of the Kirghiz and Wákis. The latter speak Persian, and are a race of Aryan descent, who came originally from Wákán, but are now settled on the slopes to the west of the Sánju pass. They are very different in almost every respect from the Kirghiz; and all along they showed such an unfriendly disposition, that it was evident, if any difficulty should arise regarding our return, the Wákis would not be pleasant customers to deal with, and we should have to put ourselves in the hands of the friendly, good-humoured Kirghiz. During a day's halt at Balakchi I obtained several hares, which the Kirghiz called toksán, and a number of newly-fledged partridges, but saw none of the adult birds. The Hoopoe, which we had last seen at Lak Zung, was also noticed. The buckthorn (*Hippophae*) and a Barberry re-appeared. I succeeded in taking some photographs of the Kirghiz, but the Wákis would not submit to be photographed.

On the 6th August we left Balakchi as guests of the Atalik Ghazi, and continued our march for twenty miles along the Karakásh, which now changes its course and flows in a northerly direction. The Yárkandis, like all Orientals, consider it "*infra dig.*" to walk, and I was obliged to give up botanizing at first and join the cavalcade. Several times I managed, without attracting notice, to lag behind and go off the road; but as soon as my absence was remarked, some of the Turki soldiers were sent after me, and very politely gave me to understand that they had orders not to lose sight of me. It seemed as if they suspected me of being a surveyor in disguise, and that my ostensible occupation of medical officer to the expedition was merely a blind.

Five miles below Balakchi we had to cross and recross the Karakásh, and this was no easy matter. A mendicant Fakir, who had followed us on foot from the Panjáb, was carried off his legs by the stream, and although rescued from drowning, he was much cut by the sharp rocks.

We passed the small fort of Sháhidulla, situated on the left bank of the river. It was originally built by the Maharajah of Kashmir, and although situate a long way beyond the Kashmir frontier, it was for a short time held by Kashmir soldiers; it is now deserted by the Yārkandis, as they have built another fort about twenty miles lower down the valley, where the Kilian pass Route joins the one by the Sánju pass, which we were to take. To-day we met some traders *en route* to Lé, who gave an account of affairs in Yārkand, which did not materially differ from that given us by Mírza Shádi; but we afterwards met a Panjábi trader, whose account differed from the others. They all agreed that perfect peace existed in Yārkand itself, but that the King was still at the seat of war on his frontier. It appeared that all the traders going to India had been stopped until it was known that we were near Sháhidulla; and strict orders had been given them not to tell us anything that was likely to make us give up the expedition.

In the afternoon we reached the Tograsu river, which flows from the west down a narrow gorge, and joins the Karakásh at right angles. We made several ineffectual attempts to cross the Tograsu, and went about two miles up in search of a practicable ford; but finding that, even should we succeed in getting across, the baggage could not

possibly follow, we encamped for the night, and next day, August 7th, about 10 a.m., when the stream was at its lowest, succeeded in fording the river on yaks. Several of our men got a ducking, and all the baggage was wetted. The Yārkandi ladies distinguished themselves for their pluck and energy, and were the first to get across. Near the Tograsu I saw what appeared to be signs of former cultivation. Nine miles march brought us to a place called Pila-ta Ghash, where there was plenty of grass. The road to-day was pretty level, but extremely bad, and without the yaks we could not have made the march at all.

Next morning we reached the foot of the Sánju pass, about twelve miles by the direct road. The baggage had to be sent round by a steep road over some spurs which project into the Karakásh valley, whilst we waded up to the waist along the face of a cliff which was washed by the river. We had previously passed the small fort of Kurgán, and, leaving the river after accomplishing the difficult part of the march, we turned to the left and entered a narrow gorge which led towards the Sánju or Grim pass. Here I caught a Weasel; the specimen was submitted for examination to Mr. G. Nevill, of the Calcutta Museum, who says: "The brown *Mustela* would appear to be interesting and possibly new. It closely resembles our common *M. vulgaris*." Unfortunately I left this specimen at Calcutta, together with all the mammals, fish, and reptiles.

We struggled along until dark over the worst ground I ever traversed, but failing to find a suitable place for a camp, we had at last to be content with a small open space where there was no grass or fuel,

and just enough of level ground to allow of three or four of the smallest of tents being pitched. The rocks all around rose almost vertically to a height of, at least, 1000 feet, and we passed rather a wretched night in the midst of Kirghiz and Wákis, with their yaks and our horses and sheep huddled together almost as closely as they could stand.

At daybreak on August 9th we were glad to get away to cross the pass, by far the most steep and difficult one on our route, although not the highest, for by the mercurial barometer it is only 16,600 feet above the sea.

When about half-way up and just approaching the steepest part, we found some fine saddle yaks of the Kirghiz waiting to convey the whole party over the pass. These yaks were so fresh and frisky that it was rather a difficult matter to mount them, each requiring two Kirghiz to hold him by the horns until the rider was fairly seated in the saddle. When let go a most ludicrous scene ensued, for the yaks bolted with their riders in every direction but the right one, scampering over rocks and stones at an alarming pace.

They are guided by two ropes attached to a ring in the nose, and it was some considerable time before we could get into the way of managing them. Some of them showed their heels, and tried to throw their riders, but the Yārkand saddle gives one an uncommonly firm seat. After a time we were all fairly started on the proper road, and soon reached the top, from which we had a magnificent view. There was almost no snow on the pass, but there was a good deal on the high ranges to the south.

On the return journey in September there were

wreaths of snow on the pass itself. On both sides of the pass we saw hundreds—I may safely say thousands—of snow pheasants, and we caught one alive that was frightened by some large bird of prey.

The hills on the east, south, and west were almost devoid of verdure; but on the north we looked down on a wide undulating valley covered with good pasturage, and could just discern the tents of the Kirghiz encampment; but on account of the haze we could not see the plains of Yārkand, which are said to be visible on a clear day over the top of an intervening range. The descent on the north side was very steep, but was easily accomplished; and about sixteen miles from last night's encampment we reached Kitchik Yilák, or as the name implies, the summer encampment of the Kirghiz. In descending I saw great numbers of marmots,* and one of the Kirghiz shot three of them for me with his rifle. I also got several specimens of a new species of *Podoces*.

One of the akooies, or Kirghiz tents, had been prepared for our reception, and we found it a remarkably comfortable dwelling. The shape is irregularly hemispherical, the walls being composed of lattice-work made of willow, in several separate pieces, which fold up for the convenience of carriage, and outside them is a covering of one or more layers of thick felt. In the centre of the roof there is a large opening, which can be closed by a fold of felt, and which answers the purpose of a window and chimney combined, the fire being lighted in the centre of the floor.

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* These specimens are described by Dr. Anderson in "Proceedings of Zoological Society of London" for June 1871, page 560.

All round the fire, rugs of felt were spread for us to sit on. Some of the tents were as much as thirty feet in span, and the height is usually about a third of the diameter. No ropes are required to fasten these tents; but during a gale of wind a few large stones are fastened round the outside. The conduct of the Wákis to-day became so unbearable, that we had to complain of them to the Envoy, and it was afterwards settled that their yaks should carry the Mírza's baggage, and those of the Kirghiz should be allotted to us.

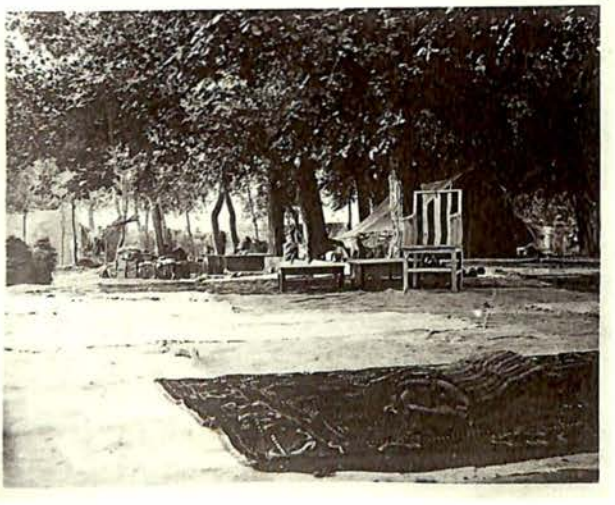
At Kitchik Yilak we met several Panjábi traders, who confirmed all the reports of those we had met coming by the Kilian pass, that the King was still absent at the seat of war; but they all agreed, that although there had been disturbances shortly before, everything was now quiet in Yārkand.

As Mr. Forsyth had the most peremptory orders to return at once should he find the King absent or engaged in war, he announced to Mírza Shádi that he had no alternative but to return to India. Mírza Shádi pointed out that no supplies could be got without going on to Yārkand, nor without special orders from the Governor of Yārkand. It was therefore decided that we should go on to Yārkand, for the purpose of getting fresh carriage and supplies, and Mírza Shádi asked that twenty-five days should elapse before we started on our return.

Letters were at once sent to the Governor of Yārkand, asking for information as to the King's movements; and informing him that in the event of the King being absent, and not likely to return soon, we proposed to come on to Yārkand to get supplies, but must at once return, so as to get back before winter.

HELIOTYPE L. REEVE & Co

KIRGHIZ TENT.
P. 103.



HELIOTYPE L. REEVE & Co

CAMP IN A GROVE OF WALNUT-TREES, AT KARGALLIK.
P. 117.

At Kitchik Yilak I took some photographs of the Kirghiz encampment, but Mr. Forsyth was politely informed by Mírza Shádi, that without special orders from the King, I could not be allowed to take any more pictures in Yārkand territory.

On August 10th we marched twelve miles to Tám. The first four miles was over grassy downs, then along the banks of the stream which, lower down, becomes the Sánju river. This stream is fringed by a jungle of Tamarisk, Willow, and Buckthorn, and there is plenty of grass. At Tám we came to the first signs of cultivation—a few huts and one solitary poplar-tree, which, being the first tree we had seen for some weeks, we all halted to stare at, much to the amusement of the inhabitants.

On the 11th August we continued our march down the stream, crossing and recrossing many times. Just below Tám the river flows through a narrow defile about 100 feet wide, where we saw the remains of a wall and fort which had been built across the gorge by the Chinese, to protect themselves against the inhabitants of the hills. The Chinese, I believe, only occupied the plains, and, except at the jade mines, never laid claim to any of the hilly country. The Sánju river was now too deep to ford below this point, so we made a detour up a valley to the right, and next day crossed the Chu Chu pass to the banks of the Arpalak river, which flows to the east of the Sánju stream. Up to the top of the pass the hills were rounded to a height of 11,000 feet above the sea, and at least 4000 feet above the Yārkand plains, and the surface was composed of a clay deposit. The

rocks cropped out only along the highest ridges. The fine clay was raised by our yaks in suffocating clouds of dust, which obscured the view in all directions. On the top of the pass numbers of Ibex were seen, and near our camp Chicore partridges were very plentiful. We encamped on the banks of the Arpalak river, where, finding abundance of grass and fuel, we resolved to halt, until we should receive from the Governor of Yārkand a reply to the letters written from Kitchik Yilak. During the halt of three days here, we became better acquainted with the Yārkandis and the customs of the country.

In the afternoon a messenger arrived saying that Kāsim Akhund, the Begi, or head official of Zangria, a town situate between Guma and Khoten, had come to pay his respects to Mr. Forsyth, and present a dastarkhan. The messenger was told we were ready to receive his master, and in a few minutes a servant came and spread a table-cloth of coloured silk in our reception tent. Then came a number of men bearing trays of sweetmeats, fruit, bread, &c., and when all these had been laid out, the Yārkandis rode up. It is the custom at all visits for the visitor to ride, even if, as in this case, he has only to come fifty yards; and if a man of any rank, he does not leave the tent until his horse is ready at the door. After the visitors are all seated inquiries are made after their welfare, on which all rise up for an instant, stroke their beards, and say, "Allā ho Akbar." The person who is receiving the visit then breaks a piece of bread and hands a portion to each of the visitors, and then invites them all to make themselves at home. Tea is afterwards brought in and handed round. The Yār-

kandis drink enormous quantities of very weak green tea, without sugar or milk.

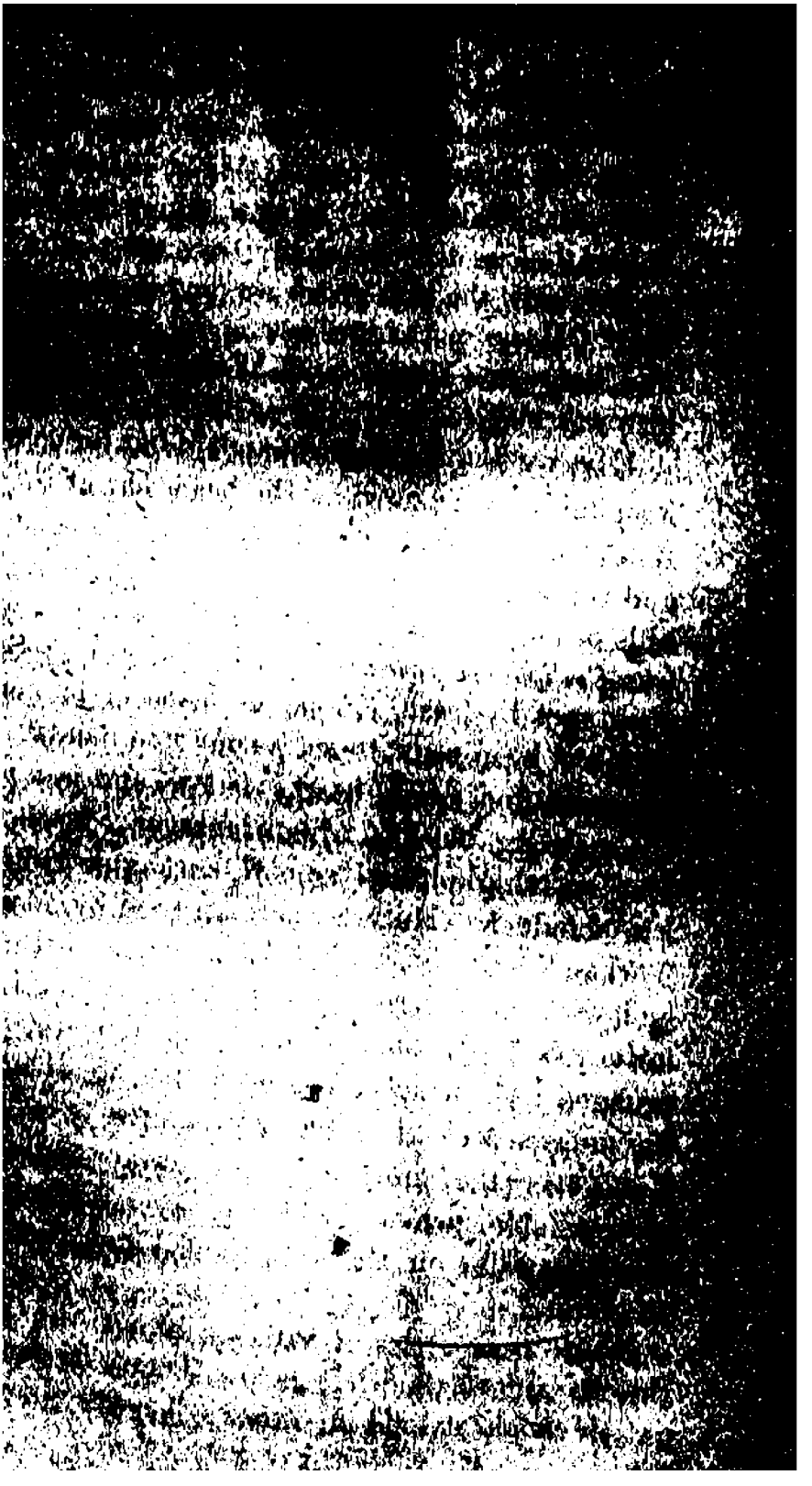
At this first visit Kāsim Akhund would not converse very freely; at a first visit I believe much conversation on the part of the visitor is not considered polite. When all have helped themselves and have declined to take any more of the good things, a servant is asked to remove them; and until this is done, but not before, it is not polite of the visitors to depart. After the trays have been removed, every one assists in picking up the crumbs and placing them in the table-cloth, for it is considered very wrong to leave the smallest crumb of bread where it may be trodden under foot; then, the moment the table-cloth is taken up, all the visitors, stroking their beards and saying "Allā ho Akbar," suddenly rise and disappear out of the tent, the object of the apparent haste being to prevent the host taking the trouble of rising to say "Good-bye."

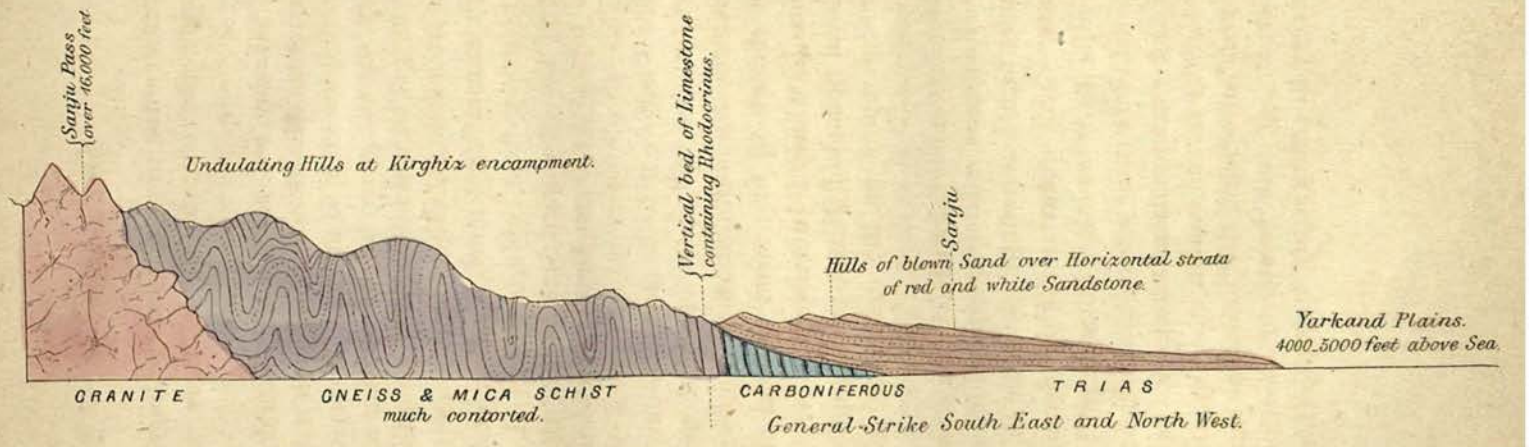
On the 15th August our Yārkandi companies marched to Sánju, accompanied by Mr. Shaw. A letter was expected from the Governor of Yārkand, and arrived that evening. The Kázi Sahib had remarked that it was certain not to contain any information which could give us any excuse for delay, and when it did arrive the Kazi's prediction was verified. Orientals never commit themselves in written documents, and questions which are unpleasant to answer are simply ignored, or are answered in such a flourish of high-flown phrases that no meaning can be made out of the answer. The Dád Khwah stated that the war was over, and that he hoped the King would be back in time to receive Mr. Forsyth's visit.

On the 16th August Mr. Forsyth and I followed the others fifteen miles to Sánju, marching for ten miles along the Arpalak stream. About half-way we came to a village called Kizil Langar, where there was some cultivation, and large shady trees of willow, poplar, and walnut, the first grove we had seen since leaving Lé. Chicore partridges were in great abundance, and I saw one Magpie. The hill crow, *C. intermedius*, also re-appeared.

Here we found a dasturkhan laid out for us, and were hospitably entertained by the head man of the village. A few miles beyond this we left the Arpalak stream and travelled for four miles over a succession of low hills of blown sand, where almost the only vegetation was *Calligonum comosum*. Two miles from Sánju we were met by Tásh Khoja, a yusbashi or centurion, who had been sent to act as our mihmandar or host. He was a fine, frank, hearty fellow, and was mounted on a strong black Andijani charger; he carried an English single-barrel smooth-bore gun slung across his shoulder. He was accompanied by about fifty Yārkandi cavalry, mounted on strong little ponies, and each man carried a sword and matchlock, the latter much like the firearms of the Kirghiz. A two-pronged fork, which serves as a rest, is attached near the muzzle, and gives the appearance of a hay-fork slung over the shoulder. The sandy waste seemed interminable, when suddenly, overstepping a low ridge, we came on the well-wooded and fertile valley of Sánju.

Sánju is a series of villages along the banks of the stream we had left below Tám; as far as irrigation canals extend on either side—say about a mile




Sanju Pass
over 16,000 feet.
Undulating Hills at Kirghiz encampment.
Vertical bed of Limestone
containing Rhodocrinus.
Sanju
Hills of blown Sand over Horizontal strata
of red and white Sandstone.
Yarkand Plains.
4000-5000 feet above Sea.
GRANITE
GNEISS & MICA SCHIST
much contorted.
CARBONIFEROUS
TRIAS
General Strike South East and North West.

or rather more—the ground is extraordinarily fertile, but outside the irrigated tract there is absolute desert.

From the day we entered the Karakásh valley until our return, the air was filled with a dense haze, which limited the view so much that, very often, hills five miles distant were barely visible, and it was difficult to get a good idea of the country through which we travelled. On the return journey we found the Sánju stream very much smaller, and followed it the whole way from Sánju to Tám. I then made a sketch of the geological structure of the country, from the top of the Kuen Lun to the plains of Yārkand. This sketch was made from a very rapid survey, but I believe it to be correct as far as it goes. On our return we halted for breakfast near the village of Kibris, ten miles above Sánju, when I was fortunate enough to find some vertical strata containing fossils, which I submitted to Mr. Etheridge, of the Royal School of Mines, who supplied me with the following report on the fossils and the section of the country :—

"Dr. Henderson has submitted to me a piece of very crystalline limestone, entirely composed of crinoidal remains, and which I unhesitatingly refer to the genus *Rhodocrinus*. This genus is highly characteristic of the carboniferous or mountain limestone of Europe and America, and there is no reason to doubt but that the specimen under examination belongs to beds of that age. According to the section made by Dr. Henderson, the beds succeeding this limestone may be coal-bearing, or at any rate belong to the carboniferous group, as they lie conformably upon the thin bed from

which *Rhodocrinus* came. Again, immediately overlying and nonconformable to the limestone, are a series of red sandstones which occupy the place of the *Trias* of England and Europe, and would appear to be of that age. It is evident that a fault or disturbance of great magnitude has brought the carboniferous series against the metamorphic gneiss and schists, which are themselves violently contorted, and rest upon granite and granitoidal rocks. The age of the schists and their relation to the granite we have no means of determining."

VII. SANJU TO YARKAND.

It is impossible for me to describe the feelings with which we again welcomed the sight of trees and green fields. We had entered the hills at Jamu three months before, and now, as far as the eye could reach, we saw before us a country not unlike Kashmir, and beautifully cultivated. At Sánju many of the crops were being harvested. They consisted of wheat, barley, Indian corn, rice, "joahir" (*i.e.*, species of *Sorghum*), and Indian hemp. The roads, or rather lanes, were lined with rows of Elæagnus trees (called jigda in Turki), now loaded with ripe yellow fruit (the Trebizond dates of England), and near every hamlet were groves of large walnut-trees. Mulberries, willows, and poplars were also common. Some of the white poplars here attain an enormous height, and have stems ten feet in girth. The most common plants were the camel-thorn (*Alhagi maurorum*), a leguminous plant (*Sophora alopecuroides*), and wild liquorice (*Glycyrrhiza glandulifera*). Sánju was found by the mer-

curial barometer to be 6570 feet above the sea, and the climate at this season was very mild, the thermometer rising during the day to 75° F. in the shade, and at night falling to 50° F.

The dastarkhan which we found prepared for us at Sánju was something never to be forgotten, and as this was the first time we had a complete Yārkandi dinner I may give a short account of the feast. When all were seated on rugs spread round the table-cloth, an attendant gave us napkins, and handed round a copper basin, over which we all in turn washed our hands, whilst water was poured over them from a large copper jug shaped like a coffee-pot. First came melons, grapes, apples, pears, and apricots, with all sorts of jams and sweetmeats. One dish, much like marmalade, was composed of the pulp of some preserved fruits and finely-sliced carrots, flavoured with lemon. Another sweetmeat, named *nishalla*, was white of egg beaten up with grated white sugar, and much resembled the icing used by confectioners in England to cover cakes. After the fruit and sweets and a great variety of fancy bread and biscuits, a large tray of *muntoos* was brought in. These are a favourite dish in Yārkand, and consist of minced mutton flavoured with onions and sweet herbs, enclosed in a thin film of very nicely made soft paste and cooked by steam. The muntoos were followed by ash—*i.e.*, a baked leg of mutton buried in rice and carrots. This is one of the national dishes of the country. The Yārkand mutton is delicious, and although fed on grass is superior to the Indian mutton fed on grain. One of our entertainers acted as carver, and all set to work with their fingers, using

cakes of bread instead of plates. We made an attempt to follow their example, but were so awkward that our knives and forks were sent for. This was the first and last time we attempted to follow the Yārkandi fashion of dispensing with knives and forks. After the ash came soup, called "*su ash*" or *su-l-ash*,—*i.e.*, watery ash. It is simply rice and minced mutton of the consistence of thick soup, and is eaten with wooden spoons. It will be seen that the order in which the dishes were served was just the reverse of ours. During our stay in Yārkand we were constantly feasted in this way, and we considered it rather a fortunate circumstance that the Yārkandi dinners and all their cooking arrangements were so well managed and so unobjectionable. A boy was told off to make tea for us. He kept a teapot constantly replenished, and every now and then when he found that our cups were empty, he refilled them. The Yārkandi teacups are equal to about three of our breakfast cups, and are made of china, or of earthenware imported from Europe, for, with the exception of the bowls of hookas and flower-pots, I saw no earthenware of Yārkand manufacture. A few vessels of porcelain left by the Chinese are still to be had in Yārkand, but they are getting rather scarce and very high-priced, and most of those we saw offered for sale were more or less damaged.

After dinner Mr. Forsyth gave presents of dresses and turbans to a number of the Yārkand officials who had come to receive us. At first they made a great fuss about taking these, and only accepted them after much pressure. This we found was the correct etiquette. In the afternoon I took some photographs

of Sánju, but as this could not be done openly, I conducted all the manipulations by candle-light inside my tent, and when ready to expose the plate, lifted up a portion of the roof of the tent. In this way I could get a picture without anyone knowing what I was about. My first attempts, however, were not very successful.

Each village in Yārkand has a market once a week, and many of the villages have no doubt originated from these weekly markets; in fact eight miles from Yārkand city we saw a village in embryo at Yangi Bazar—*i.e.*, new market.

I noticed a species of wagtail very common here. It was called *soong goch*, and is said to remain all the year round. A lark called *togai*, and the black Hill-crow of India, called *kagha*, were also common.

I was told that silk is largely produced around Khoten, three or four marches to the east of Sánju, but neither at Sánju nor at any other village did I see many mulberry trees, called *zhuma*, and those seen, except on one occasion, did not bear the marks of having been lopped for feeding silkworms.

The very hearty reception we met with at Sánju showed that the Yārkandis intended to treat us well; and throughout our sojourn in the country our impression was confirmed of their being extremely hospitable people. In fact, their hospitality was quite overpowering.

On August 17th we marched twenty-five miles, to Koshtak. We first had to ford the Sánju river, and a mile beyond we left the cultivation, and entered an undulating desert of blown sand, in which almost the only plants noticed were small bushes of *Calligo-*

nium and *Lycium*. The only animal life I saw in this desert was a large lark near the river, and in the sand of the desert a new species of *Podoces*, called *kum tuché*, the flesh of which is said to be good eating. But I may note that the Yārkandis are not very reliable informants, and always try to suit their answers to the supposed wishes or gullibility of the questioner.

After fourteen miles of desert we saw some tall trees in the distance, and very soon descended from the sand-hills to a gravelly plain about 150 feet lower, where we found a little oasis, consisting of a few acres of cultivation and a few clumps of large trees. Here I overtook the rest of the party, who had arrived about an hour before. Mírza Shádi again complained about my leaving the cavalcade and going off the road. He said that he was responsible for the safety of the party; but as far as one could judge, the only risk to life in Yārkand is from the men in power, and as long as they are friendly one is perfectly safe. I believe that not only life, but property also, is safer in Yārkand than in many civilized countries. Theft, I believe, is often punished with death. I believe that when a trader's horse gets disabled and cannot proceed, the load of merchandize is often left for months on the road, and is perfectly safe until the owner's return; in fact, we saw quantities of merchandize which had been thus left for months near the Sánju pass. We often had discussions with the Envoy and Kázi Sahib about crime and criminals. They expressed great admiration for everything connected with our rule in India, except our treatment of criminals, which they considered absurdly lenient.

Their argument was that as thieves, after two or three convictions, are almost certain to continue to steal and to breed a race of thieves, the good of the public requires that they should be executed. They told us that in Yārkand, for a minor theft the rule was to admonish once, flog the second time, cut off one or both hands for the next offence, and cut the man's throat if again found stealing. I believe justice is administered in rather a capricious way in Yārkand, generally characterized by severity and very prompt disposal of the cases. The envoy told us that imprisonment seldom lasted longer than three days; but, as I have said before, Yārkandi statements are not very reliable.

At this little oasis I caught a hedgehog (*Erinaceus albiventris* of Wagner.)

We reached Koshtak in the afternoon, and were splendidly feasted there. As at Sánju, there is a belt of cultivation about two or three miles wide, along the banks of a series of small streams.

Next morning, August 18th (minimum thermometer during the night 60° F.), we left Koshtak at 6 a.m. to march fifteen miles to Oi Tográk. On starting I shot a number of swallows, which turned out to be *Hirundo rustica*—the common English swallow. They were collecting in large flocks, and had migrated before our return in September; the Yārkandi name is *kalder goch*. The desert *Podoces* was again common, and I also got the Golden Oriole at Oi Tográk. I noticed to-day fields of carrots, peas, beans, and some very poor flax, which is only grown for the seed.

To-day we crossed a great number of small streams,

without any cultivation along their banks; we halted about midday at the last of these, where there was a clump of bushes, consisting of wild liquorice, Tamarisk, *Myricaria*, *Hippophae*, and Elæagnus; the last appeared to be wild; it had smaller leaves and fruit and more thorns than the cultivated specimens, but possibly the plants had grown from seeds dropped by travellers. After this we passed over a waste of sand-hills. In some places I saw horizontal strata of coarse red sandstone and conglomerate, appearing above the surface. Oi Tográk—oi, a house, and tográk, a poplar-tree—did not differ from Sánju and Koshtak. In all these places there is a valley 50 to 200 feet below the level of the intervening desert. All the water required is obtained from the streams, and I only once saw a well in Yārkand—namely, at the oasis between Sánju and Koshtak. The water was at a depth of about six feet from the surface, and, from its filthy condition, I judged that the well was only resorted to during very dry seasons.

Tásk Khoja now left us to go on to Bora, the next stage, and within the jurisdiction of his master, the Governor of Yārkand. Hitherto we had been entertained by the Governor of Guma, which is a town some miles to the north, and all the fruit we had received was said to come from that town, for, with the exception of the Elæagnus and walnut, we had as yet seen no fruit-trees.

The Kázi—*i.e.*, judge—of Guma came to consult me at Koshtak about a large goitre. Every third man we met suffered from this disease, which was almost the only one I had to treat. It often attained an enormous size. Fortunately I had brought a large

supply of iodine in various forms. Our baggage, after leaving Sánju, was carried on the backs of bullocks. These want the Indian hump, and, although very poor-looking animals, are wonderfully hardy, and carry the loads admirably. A number of artisans and old soldiers had been entertained by Mírza Shádi in the Panjáb and Kashmir, and had come with him to Yārkand under promise of very high pay. One man, who had formerly been a sergeant in our native army, had the promise of a colonelcy in Yārkand and 400*l.* a year to start with. To-day I came up with this man on the road, and found him in a state of great distress. He had learned from some Panjábi traders, whom he had met, that beyond food and clothing he need never expect any pay, and moreover would never be allowed to leave the country.

Mr. Shaw had not brought his tent beyond Sánju, and the mosque at Oi Tograk being the best house in the village, was made over to him to reside in. Indian Mussulmans would have considered this the height of desecration, but the Yārkandis, although probably the most bigoted Mahomedans in the world, seem to consider Protestant Christians simply as very low-church Mussulmans, who are not at all attentive to the outward forms of religion. Christian churches which use images of any sort are looked on as idolatrous, and classed with Hindus.

From Oi Tograk to Bora was a short march of twelve miles, over the same sort of country as yesterday. We met a string of Bactrian camels carrying merchandize to Ladák. The men in charge of the caravan informed us that nothing was known re-

garding the King's movements, but that reinforcements were still being forwarded to the seat of war. The heat during the day was becoming daily more oppressive, being 80° F. at mid-day in the shade, and seldom under 65° F. during the night.

On the morning of the 20th August we left Bora at 2 a.m., to avoid the heat, as we had before us a long march of twenty-four miles to Kargallik.

At sunrise all the Yārkandis halted for morning prayers. I should mention, that along all the frequented routes in Yārkand there are small square spaces marked off by a row of stones. These spots are considered consecrated, and are used by travellers in place of mosques; and in the absence of water, the ablutions which it is necessary to go through before prayers, are performed with sand, in place of water. During the morning devotions a number of the horses usually got loose, and we used to have very exciting hunts after them. The pace we usually travelled at was about five and a half or six miles an hour. The Yārkandi ponies go at a "yulga" or ambling pace, which is so easy that one can go to sleep on horseback quite comfortably. At times nearly the whole party went to sleep jogging along on horseback. About 7 a.m. we arrived at the village of Beshirak, and had to go through all the courses of the dastarkhan, from melons to soup, at that early hour. Five miles further on we came to Kargallik, the largest town we had yet seen. On the outskirts of the town we passed the ruins of an old Chinese fort.

The town itself did not differ from any large village in the Panjáb, or I may say, the East generally.

The houses were all of mud or sun-dried bricks, and only one story high. The streets were in many places covered with trellis work, on which vines and gourds were trained to give shade during summer. There were crowds of well-dressed people in the streets, who were remarkably polite, and salaamed as we passed, not in the Indian fashion, but by placing the hands flat on the stomach and slowly bending forwards. The people seem fond of gardening and flowers, for I noticed, attached to the houses, many flower-gardens, in which roses predominated. On the roofs of the houses, also, boxes of asters, marigolds, and balsams were common. At the end of the town we passed a gallows, with pulleys for three malefactors; it was placed in a very prominent situation, just at the end of the principal street. It is said to be chiefly used for thieves, who are first suspended by the neck, and then have their throats cut; political offenders have the privilege of having their throats cut without being hanged as well. Our camp was pitched in a fine grove of walnut-trees near the town. As we neared Yārkand, the dastarkhans increased in bulk and quality, for about four horse-loads of fruit were here waiting us. Other signs of preparation for our reception also appeared, in the shape of chairs and tables of the most quaint construction—the tables being only a foot from the ground, whilst the seats of some of the chairs were three feet high. A series of attempts seemed to have been made by different artists to construct a proper chair, and the result was most ludicrous, for each chair was built on an entirely different plan. In the afternoon hundreds of sick came to my tent. The majority were cases of goitre,

indigestion, or cataract. I saw one well-marked case of leprosy in a boy of ten years of age, and a case of elephantiasis of the leg in a boy of twelve years.

We had now arrived within three marches of Yārkand city—namely, to Posgam twenty miles, Yangi Bazar fifteen miles, Yārkand eight miles. These three marches were by far the most interesting part of our journey, for we were now out of the desert, and rode through cultivation and villages the whole way. Unfortunately, I was usually obliged to yield to the custom of the country and ride with the cavalcade, and could not go about shooting or collecting plants, except at the halting places.

The whole country here is intersected by canals; and at the points where these were crossed by roads, substantial wooden bridges had been constructed. We had to ford several streams near Kargallik, one of which was about four feet deep.

We met numbers of villagers going to the fairs, most of them mounted on donkeys, and passed numerous fields of cotton, the plants loaded with pods of very long fine fibre; but the plants themselves were very stunted, being only about eighteen inches high. As a rule, the banks of the canals are not kept free from weeds and long grass, and the result is that many of the fields contain fully more weeds than crop, and have a neglected look. This is by no means the rule, however, and many of the fields of Indian corn were as fine as any I have ever seen. Religious mendicants, generally in parties of three, were seen at every turn; they are distinguished by wearing tall wide-awake hats, about the size and shape of an ordinary sugar loaf.

Whenever we approached them they salaamed,

and shouted, "Huk Alla, Huk Alla." These men are held in some reverence, or perhaps it is considered unluckly to meddle with them. Unlike Indian beggars, they were not above accepting food from our hands.

At Posgam we first saw orchards of grapes, apples, pears, peaches, &c.; all the trees were loaded with ripe fruit. A gourd is largely cultivated in Yārkand, from the dried rind of which water vessels and huka bottoms are made. The fruit seems capable of being grown into any required shape, probably by careful selection of seed, and hybridizing. Many of the water vessels made from it are the size of a large bucket.

At Posgam we found quarters specially fitted up for us in the caravanserai, about a mile short of the town. Each room had an opening in the roof, to serve for a window. Mr. Shaw found this arrangement very convenient for taking the latitude without being observed. Almost daily, whilst he was engaged in taking his observations, he was supposed by the Yārkandis to be asleep; and Tásh Khoja, who no doubt had some idea of the dodge, used to remark to me, with a very knowing wink, that Shaw Sahib seemed to sleep all day and all night too.

The town of Posgam, which we passed through next day, was much the same as Kargallik, but smaller in size. At several of the taverns or eating-houses the cooks were standing at the door, dressed in white aprons; and inside we saw rows of tables and benches, which are never seen in private houses.

All the way from Kargallik to Yārkand there were tall wooden mile-posts along the roads, at intervals of about five miles—or rather, of one hour's journey—apart. On a board at the top of each post, or "farsang," as it is called, the distances are very legibly written in Turki. The roads in Yārkand are about thirty feet wide, and are usually deeply worn, so as to be from three to eight feet below the level of the surrounding country; and, except where they cross the canals, no labour seems to be expended in keeping them in repair. As a rule, they were good, except where they had been accidentally flooded by leakage from a canal. In a few places I saw marks of wheeled conveyances, called "arabas," having passed over the road.

The English lapwing was common in all the marshy ground; it is called *machung* in Turki.

The evening of our arrival at Posgam a messenger from the Governor of Yārkand arrived with a letter for Mr. Forsyth, and a complete suit of Yārkandi costume for each of us. We were told that it was necessary to give this messenger a present, in token of being pleased; and as our own things had not come up, Mírza Shádi at once divested himself of a new robe he had on, and this was presented to the messenger, being put over his shoulders when he departed. Whenever a dress is thus presented, every one congratulates the person who has received it, by saying "Mubárik;" he replies "Kulluk." I have said that we obtained complete outfits, but this is not quite correct; for, strange to say, the turban was always omitted. This was rather a noteworthy fact, for only true believers are allowed to wear turbans in

Yārkand. We always used turbans of our own the few times we appeared in the dress of the country. Our Hindu servants were allowed to wear turbans; but, as I have said, the turban was always omitted from the dresses presented to us, except on one occasion, when we received dresses from the Kázi Sahib, and on that occasion Mr. Forsyth had a turban included in his suit. Tára Singh told me that he had, when here before, offered to pay 20*l.* to be allowed to wear a turban and ride on horseback, but his petition was not acceded to.

Between Posgam and Yangi Bazar we had a slight rain, the first and last we saw in Yarkand. Yangi Bazar is a weekly market only lately established; it consists of rows of shops and sheds along both banks of a canal; it is half a mile from the ferry on the Yārkand river, and about eight miles from Yārkand city. I had a stroll along the banks of the river in the afternoon, and found it exactly like one of our Panjáb rivers, with Tamarisk jungle on either bank; it was now at its highest, varying from 70 to 150 yards in width, and, not being fordable, could only be crossed by boats. I saw marks of excavation in the sand, and was told that washing for gold was now being tried for the first time. I noticed here several good-sized trees of the *Ailanthus glandulosa*, which had evidently been planted.

Several natives of the Panjáb came out to meet us. One of these had gone up two years before with Mr. Shaw, and was now settled as a shopkeeper in Yārkand. He gave a very exaggerated report regarding the preparations made for our reception, and amongst other items said that the curtains on our doors were

all made of gold brocade. From what we heard, however, it was clear that preparations for our reception had been going on for months. One rumour was that we were expected to bring with us a number of European troops, to assist the King.

VIII. ARRIVAL IN YARKAND, AND STAY IN THE CITY.

On the 23rd August we marched eight miles from Yangi Bazar to the city of Yārkand, crossing the Yārkand river by ferry-boats a mile after starting. A dastarkhan was waiting us in a garden close to the ferry, and whilst we regaled ourselves all our baggage was got safely across. The crossing was a work of some difficulty, for there were only two ferry-boats and the current was very rapid, repeatedly carrying the boats half a mile down stream, whence they had to be towed up again.

Having got across the river, we found thirty of our followers drawn up to form an escort. They had all been drilled to some extent, and were dressed up in neat scarlet uniforms, trimmed with gold lace, snow-white turbans, and each armed with a sword and carbine; when all were mounted they formed a very respectable guard, and quite took the shine out of the Yārkandi escort as far as appearance went. Half a mile from the ferry we crossed, on a rude bridge of boats, another branch of the river; and a mile further on were met by a party of horsemen, which turned out to be Mansur Khoja, the Chancellor of the Yārkand Exchequer, with an escort, sent out to do us honour. Mansur Khoja received us very cordially, and was presented on the spot with a

gorgeous robe of green satin trimmed with gold lace, which, according to custom, he wore during the rest of the day. Our road lay at first over a low swampy country, and afterwards through lanes lined on either side with shady trees, and amidst rich pasturage or well-cultivated fields, for about six miles. At last we saw in the distance a low battlemented mud wall—the walls of the city of Yārkand, which for three months we had been looking forward to. As we neared the city we were met by crowds of the Yārkandis, who stood three or four deep along the roads. They evidently did not know which of us were the Europeans, all of us being dressed in Oriental costume.

We could not avoid remarking that a number of the Yārkandi faces were precisely like those of Englishmen, being for the most part quite as fair, and many of them having rosy cheeks. No females were observed; and I was afterwards told that the rule against females appearing in public is more strictly observed in Yārkand than in most Mahomedan countries.

The city wall is about thirty feet high, and is built entirely of sun-dried bricks, and outside the wall there is a ditch. We entered by one of the gates, and found a guard drawn up inside, composed of villagers, or the peaceful inhabitants of the city, shopkeepers and others, who formed the Yārkand reserve force, and were now called out to do military duty in the absence of the regular troops at the seat of war. They were armed in the most primitive way, with clubs, ancient-looking spears, battle-axes, &c. One man had a very extraordinary looking weapon, namely, a jointed stick somewhat like a flail, the farther extremity of

which was about two feet long, and armed with rough-headed nails stuck all over it.

The execution scaffold, which formed one of the most prominent objects near this gate when Mr. Shaw was here before, was now conspicuous by its absence, and was said to have been temporarily taken down in honour of our arrival. We passed through many winding streets, most of them clean and wide, and in many places roofed over with trellis-work and vines, as at Kargallik. The shops and houses were precisely like those in every Oriental town; but from the scarcity of timber, and the absence of stone and kiln-burned brick, all the houses are limited to one story in height. A number of buildings more imposing in appearance than the others were pointed out as being colleges, where, it is said, the Koran only is taught. At the further end of the city we passed through a gate guarded similarly to the one by which we had entered, and a quarter of a mile beyond saw before us the fort called Yangi Shahr (*i. e.*, new town). This fort was built by the Chinese to command the city, between which and the fort there is a wide street with ruined houses on either side. Near the gate of the fort we passed a mound on which was a human head stuck on the end of a tall pole, the long hair streaming in the wind, and probably therefore not the head of a Mahomedan, for all true believers here shave the head. The fort was surrounded by a wall and ditch of precisely the same sort as those of the city.

There is only one entrance gate to the fort, and this was guarded by a much more military-looking detachment than that at the gates of the city, all being dressed in neat scarlet uniforms and armed with

swords and matchlocks. I may mention that only the infantry wear any regular uniform; the cavalry, who form the mass of the army, and are simply equivalent to mounted infantry, seem to dress as they please, and carry all their worldly effects attached to their saddles.

We entered by the gate of the fort, and found a busy town inside; passing through a crowded bazar for a hundred yards, we arrived at the quarters which had been prepared for us. Our residence was extremely spacious and comfortable, and had evidently been built and fitted up specially for our use, which must have been a work of several months. Chairs and tables had also been provided. A splendid dastarkhan was at once brought in. Our quarters consisted of several courtyards; one of them was laid out as a flower-garden, and had a tank in its centre surrounded by rows of willow-trees. Three suites of rooms faced these courtyards, and a third yard, surrounded by rooms on all four sides, gave accommodation to our servants; another yard had good stabling for all our horses. Our Mihmandar, Tásh Khoja, and his men were quartered at our gate as a guard of honour, two of the men mounting sentry, one at either end of a long passage which intervened between the street and our quarters.

We had been led to suppose that immediately on arrival we ought to present ourselves to the Governor; and he himself had written some days before, expressing the utmost impatience to see us. This precisely suited Mr. Forsyth's instructions, and he therefore intimated his wish to call at once on the Governor; but we soon found that the Yārkandis intended to

delay us as much as possible, and we also found that it was the custom for an ambassador to place himself entirely under the orders of the authorities of the country as regarded his movements. A polite reply was therefore sent to Mr. Forsyth's message, that as we must be very tired after our long march, we had better rest for a few days before proceeding to business.

On entering the gate of the fort, one of our men learned from a brother Pathán that Ibrahím Khan, who had been sent from Kashmir to Yárkand *viâ* Yásín, was kept in confinement. Mr. Forsyth waited for some time to see if Ibrahím Khan would be released, but as no mention was made of him, he asked that he might be brought. Mírza Shádi at once produced Ibrahím Khan, and made many apologies for the detention. Mr. Forsyth's first message intimating his desire to see the Governor not having been successful, he wrote a letter and again requested an interview, and after a good deal of troublesome negotiation, 4 P.M. next day, August 24th, was fixed for our first interview. The messenger first sent returned after considerable delay, and said that the Dád Khwah was asleep, and nobody dared to disturb him. On being sent a second time, he came back with a report that the Dád Khwah had awoke, but was drinking tea, and therefore he had not delivered the letter. It was therefore sent by one of our own men, and a reply was brought that next morning an hour would be appointed for the interview. I need not say that if a European officer sent to an Oriental court once allows himself to be trifled with, and accepts frivolous excuses of this sort,

or submits to the smallest indignity without remonstrating, he loses entirely his independence, and is likely soon to find himself placed in a very undignified position, for the more he yields the more he is required to yield. Next day, when the time came for our visit to the Dád Khwah, Mírza Shádi, who was to conduct us to the palace, came for us on foot—a mild attempt to get us to walk—and he hinted that we might walk, as the distance was said to be only about fifty yards; but as it is considered *infra dig.* to appear on foot in Yārkand, Mr. Forsyth declined to walk, and we accordingly rode, and found the distance not much short of 300 yards. We passed a number of guns drawn up in front of the artillery barracks, and crowds of soldiers lounging about. At the gate of the palace we dismounted, and after passing through several large courtyards filled with troops, we arrived at one which was quite empty, a guard of soldiers being drawn up under the gateway leading to it. Here almost all our followers remained behind, and we were conducted by Mírza Shádi to a door at the farther extremity of the yard, where we were most cordially received by a little man very plainly dressed. This was Mahomed Yunas, Dád Khwah—*i.e.*, lover of justice—who is the second man in the kingdom, the Governor of Yārkand city, and all the surrounding country. He conducted us to the end of a large room, where rugs and cushions were arranged on the floor. The presents we had brought followed us, and did not appear until some time afterwards, when a few of the fire-arms, &c., were brought in to be explained.

The conversation was almost entirely confined to

compliments. It is not considered polite amongst Orientals to talk of business at a first visit. After a long conversation, drinking several cups of tea, and doing justice to a dastarkhan which required sixteen pages to carry it, silk robes were put over our shoulders, and we returned to our quarters.

During the interview Mr. Forsyth expressed a wish to visit the city and surrounding country, and was told that he might do so; and as soon as we reached home we dressed in riding costume and were about to remount our horses, when Mírza Shádi arrived, and expressed surprise at our going out, as he said the bazars were not prepared for our inspection. He evidently did not wish or expect us to go out at all, but as it had been expressly stipulated at Lé that we should be free whilst in Yarkand to go out when and where we pleased, and not be confined as Messrs. Shaw and Hayward had been, Mr. Forsyth decided on going for a ride across the country. The question of our freedom to go where we pleased was a very important one, and, having arisen, it was necessary to actually insist on our liberty. Had we yielded to excuses now, to put off going out for one day, next day they would have found much stronger reasons for our not moving about freely.

We rode along the Kashgar road for a few miles to the west of the city, through a richly cultivated country, which had the appearance of being well-wooded, although trees are chiefly confined to the borders of fields and roadsides. We noticed evidences of considerable engineering skill in the bridges which cross the numerous canals. The people we met were remarkably polite. As we rode along the fort we could see

the marks of musket balls in the wall, indicating the points at which the Chinese garrison had been hardest pressed.

On our return we found that our ride out alone had not been very pleasing to the Yārkandis. They evidently wished to treat us well, but did not intend us to act as if we were entirely free. The Dád Khwah was placed in a very difficult position, for if he allowed us to go about freely, he could hardly prevent Mr. Forsyth from carrying out his instructions to return to India at once; and it was very evident that without orders from the King the Dád Khwah dared not assist us to return. In fact, he afterwards got Mr. Forsyth to certify that he had used every legitimate means to detain us, and had not in any way facilitated our departure.

During our short stay in the city our time was occupied in paying and receiving visits, and in arranging for the return journey. It was clear that we could not trust to getting much assistance from the Yārkandis, and Tára Singh was accordingly sent to purchase horses and get ready pack-saddles in the bazar. This he managed admirably, and when the day previously fixed for our departure arrived, and there was some delay in giving us carriage, we were quite independent of any assistance. Everything we wanted during our stay was most liberally supplied, with the exception of carriage, and at last, when the Dád Khwah saw that it was useless to hold out longer, he sent us the horses we required, and we reserved our own animals for the Desert. For three days before our departure we were literally loaded with presents of furs and other warm clothing, not only for our-

selves, but for our forty followers. One day four men arrived, bearing forty pairs of long riding boots slung on a long pole. Mr. Forsyth was placed in a most trying position; he had the most positive orders to return at once if he found that the King was absent or engaged in war, and at the same time it was necessary to keep on good terms with the Yārkand rulers. That he succeeded in the latter object was shown by the honourable treatment we received on our return journey.

The Yārkand authorities seemed to have very great doubts as to my occupation. The Dád Khwah is a great "hakim"—*i.e.*, physician—and every day he used to send me bottles of medicine with the labels carefully removed, wishing to know what diseases the contents of the bottles were intended to cure, and in what doses the medicines should be given. His object, no doubt, was to test me, and see if I knew anything about medicine. Most of the medicines were of a very harmless description, such as essence of peppermint, essence of ginger, carbonate of soda, citric acid, and such like. On leaving Yārkand I made over to the Dád Khwah a quantity of iodine, for the treatment of goitre, at which he was very much pleased.

It was not easy, during a short stay of thirteen days, to gain very much information not already known to Mr. Shaw, and which has been so well given by him in his book.*

The neighbourhood of the city is, as I have said, richly cultivated, the soil being a light-coloured

* "High Tartary, Yārkand, and Kashgar."

sandy loam, which, owing to the excessive dryness of the climate, hardly produces even weeds without artificial irrigation, but when irrigated gives excellent crops. The marshy ground about the city seems to be lower than the level of the canals, and is occasionally flooded by leakage from the latter, or from the overflow of the river and its numerous branches. On all this low ground there is good pasturage, and the supply of water is so plentiful, that the area under cultivation admits of almost indefinite extension. I could not myself explore the country round, but I judged that it was chiefly marsh, from the fact that almost all the birds brought in by my collectors were waders.

No stones or rocks were observed, and from the scarcity of fuel, the bricks used in building are all simply sun-dried. The bowls of hukas, which were almost the only articles of burnt clay observed, were of a black colour, like a brick which has been over-fired.

All the water for domestic purposes is taken either directly from branches of the river, from canals, or from tanks which are filled every few days. I saw only one well — viz., between Sánju and Koshtak. The water there was eight feet from the surface. The tanks are very subject to pollution, for horses and cattle drink from them, vessels of all kinds are dipped in them, and no precautions are taken to prevent dirty water running into them; and we attributed the slight illness from which we all suffered during our stay to the use of this water. If the theory is correct that cholera is chiefly conveyed through impure water, an outbreak of the disease in Yārkand would be very fatal. I made many

inquiries as to whether or not there had ever been such an epidemic, but no satisfactory information could be obtained. Some said that there had been a severe epidemic ten or twelve years ago, and that it was supposed to have come from Badakshán, others said from China, whilst others denied that any such epidemic had occurred.

During winter all the tanks are frozen to a thickness of several feet, and the ice is stored for summer use. We received daily supplies of this ice, which was quite as clear as what passes under the name of Wenham Lake ice. Water-power is used for driving stampers for crushing rice. I saw some of these near Posgam, but could not make a very close inspection of their mechanism.

During the whole of our stay in Yārkand territory the weather was uniformly fine, with the exception of one day near Yangi Bazar, when a few drops of rain fell. The thermometer in a lofty verandah, with a northern exposure, rose to 92° F. at 3 p.m. on August 29th, and this was the highest temperature recorded. The lowest temperature of radiation during the night was 47° F., on the morning of the 3rd September; and the same day at 10 a.m. the temperature in my room, with all the doors open the night before, was 65° F.

A few clouds were seen every day, and they were always passing in a direction from south-west to north-east. The mercurial barometer was very carefully read on three days, and made the height of Yārkand as follows: The reading on the 24th August gave 3868 feet; on the 26th August, 3798 feet—difference, 70 feet. Hayward, by the boiling-point thermometer, estimated

the altitude at 3830 feet, which is just three feet less than the average of my observations. On the 3rd September the barometric reading gave the height as 4328 feet, or 495 feet higher; but I afterwards ascertained that a heavy fall of snow had occurred about that date on all the mountains to the south, and the fall in the barometer was probably caused by this change in the weather. It shows, however, how very unreliable are heights deduced from single observations.

The extreme difference between the readings of the mercurial barometer was 0·36 inches, and between the readings of the aneroid (which was observed much more frequently), 0·7 inches; but I am quite satisfied that the aneroid cannot be depended on, particularly after being exposed to rather rough usage for several months.

A haze filled the air during the whole time we were in the country, and only at one or two points—viz., between Bora and Sánju—could we get a glimpse of the low hills to the south, and the higher ranges were never visible.

From all I could learn, the rainfall is extremely scanty, and only occasionally in winter a little snow falls. Most of the crops seen have been already noticed; but I may here recapitulate them. We noticed all the winter and summer crops of the Panjáb, except sugar-cane—viz., rice, wheat, barley, millet, Indian corn, joahir, and impee, which two last are species of *Sorghum*—gram (*Cicer arietinum*), peas, beans of at least a dozen varieties. Linseed is grown only for the seed, and hemp for the extract, the fibre of neither being utilized. Enough cotton is grown to

supply clothing for all the lower classes, at a much cheaper rate than the same description of cloth can be purchased in India, putting out of the question the very different values which money has in the two countries. All the better classes wear garments made of silk, or of English or Russian cotton fabrics padded with cotton wool grown in the country. The demand for English fabrics in Central Asia is capable of enormous increase

The wheat crop is sown in autumn. Indian corn is the grain chiefly used for feeding horses, and Indian corn-flour is said to be mixed with wheaten flour to make the bread white, and certainly the Yārkand bread is remarkably white; but whether the result is arrived at in the way mentioned I cannot say. I saw several fields of the species of *Sorghum*, which was at one time grown experimentally in the Panjáb under the name of *impee*. From this sugar might be made, instead of, as at present, being all imported from India or Russia. The chief fodder plant is lucern. Tobacco is pretty generally cultivated. Other crops noticed were carrots, turnips, radishes, onions, cabbages, cucumbers, melons and gourds, red pepper, fenugreck, tomatoes, and coriander. The fruits were grapes, apricots, peaches, nectarines, plums, apples, pears, and figs; neither quinces nor pomegranates were seen. The fruit of the elæagnus (in Turki, "jigda"—called in England Trebizond dates) is eaten, but does not seem to be much esteemed.

Most of the timber used for construction or fuel is either willow or poplar. Large buckets for carrying water are made by scooping out the centre part from logs of wood, leaving only about half an inch

of the sap wood. A circular section of a similar log is then fitted in to form a bottom, and the bucket is carried by a rope across the top, fastened in the same way as in the buckets used on board ship.

Very primitive matches for lighting are made from willow wood. A block of this wood, eight inches long by three inches across, is split into slices so neatly that the bundle of matches, when tied up for sale, retains precisely the form of the original block of wood. One end is then dipped in sulphur.

The domestic animals are ponies, which are said to come chiefly from Aksú; they are of a very robust build, and extremely hardy, looking like miniature English cart-horses; their price in Yārkand varies from about 4*l.* to 15*l.* A larger breed of horses come from Kokan. All the horses are very docile; and one man, mounted on horseback and flourishing a long whip, can drive fifty of them on the march without much difficulty. When thus driven in company for some time, they seem to acquire a great affection for each other; there are usually one or two which the others follow as their leaders, and if the driver selects these to ride, the others follow without any trouble. On one occasion, on our return journey, when one of my Yārkandi horses slipped down a snow slope about 200 feet, and although uninjured, had some difficulty in extricating himself, two of his stable companions showed the greatest anxiety for his safety. They could not be induced to proceed until he again rejoined them, but ran about in a state of great excitement, neighing to their companion below; and when he regained the road they caressed him in the

most affectionate way. The Yārkandis are very good riders, and are very careful of their animals. They have a curious custom of walking the horses up and down for hours, after coming into camp off a long day's march. If this were only done for a few minutes, to allow the horses to cool, I could understand the meaning of it; but I have often seen them continue this exercise for two hours before the horses were given their grain or sent to graze. In crossing the high desert region horses very often drop down ill, apparently suffering from colic, which may be caused by the very bad grass or other herbage they are obliged to eat, or by their swallowing quantities of grain without mastication after long fasting. The traders have an idea that horses when at great altitudes should be stinted of grain. In the case of some of our horses which died, the fatal result was attributed to giving pulse instead of Indian corn. When a horse thus drops down, the practice is to slit open the nose, and extract pieces of the nasal cartilages. I think the balance of evidence was in favour of letting the animals alone, for those operated on all died, whilst of those let alone a few recovered.

Horses and donkeys are used in Yārkand for treading out the corn; and the man who drives them during this work always rides. In fact, a Yārkandi never walks a yard if he can possibly be mounted. Horses are not used for ploughing; this labour is reserved for the cattle, which are yoked very wide apart — at least five feet — to a plough, very closely resembling the Indian one. Donkeys are in universal use amongst the villagers for carrying loads and for riding purposes, and some of these are

remarkably fine animals. During the Chinese rule mules were extensively bred; but this has now been entirely given up. The Governor of Yārkand showed us some very neatly-made country carts with very high wheels; and in one of these a couple of mules were yoked. These were the only mules I saw in the country. Horse-flesh is eaten, but I know not if it is considered a delicacy.

The cattle, as I have said, want the Indian hump, and are as a rule poor-looking animals. They do not seem to be often fed for slaughter, but are chiefly used as beasts of burden and for ploughing.

Yaks' flesh is largely used as food; it has a very high colour, and is said to be rather coarse. Yaks are not usually brought to the plains, in summer at least, except to be slaughtered. Most of the ropes in use are made of yaks' hair. Goats are not very common, and the few I saw had for the most part horns with only one curve straight backwards, like the ibex, and not the spiral twist of the markhor horns. Mutton seems to be the staple animal food, and mutton fat is used for making large dip candles about two inches in diameter. Every soldier is said to have meat at least once a day. The sheep we saw were of a remarkably fine breed. They are usually without horns, or have only very short ones; most of them are white, with chestnut faces, and all have a slightly enlarged tail. The ears of both the sheep and cattle, and I think of the goats also, are short and erect; not long and pendulous, as in the Indian breeds. The wool of the sheep is long and fine, which is remarkable in such a dry climate; but probably most of them come from the Kirghiz pastures, where

the climate is colder and more moist than on the plains.

The Bactrian two-humped camel, with very long shaggy hair, is common on the plains, and is generally larger in size than the Indian camel, closely resembling those brought from Cabul with merchandize, except in being of a much lighter colour. The flesh of young camels is said to be considered a great delicacy. We saw abundance of poultry at every village, but I never noticed any ducks, either wild or domesticated. Dogs are not petted in Yārkand; on the contrary, they are ill-treated wherever they appear. A few very pretty little Skye terrier-looking dogs still remain since the Chinese were expelled, but the owners keep them out of sight. Cats are in great favour. Wild pigs are said to be plentiful in the jungles along the rivers, and pork was eaten even by Mahomedans during the Chinese rule, but now the very name of the unclean animal must not be mentioned.

I saw no antelopes, but they were said to be common in the desert, where wild camels, lions, and tigers, were also said to be occasionally seen; but the Yārkandis are not much given to speak the truth, and if any large carnivora exist, I think it probable we should have seen some of their skins, being on the look-out for them. I believe that quantities of fish are caught in the Yārkand river and brought for sale to the market, and I saw numbers of small fish in the shallows; but although I repeatedly sent out men with nets to capture fish for me, I never succeeded in getting any specimens. Tásh Khoja promised every day to get me fish, but he never fulfilled the promise.

One day I asked him to get me a man who would catch rats and mice for me, as these were said to be very common, but he was so amused at the request, that I could not convince him I was in earnest. He said, "Ah, Doctor Sahib, Doctor Sahib, you are making fun of me;" and away he went, probably to inform the Dád Khwah. I saw a few lizards in the desert, but failed to secure any of them. Frogs were not uncommon about the tanks.

Mr. Forsyth got Hari Chand to survey the city and fort, and make an estimate of the number of houses. I have reproduced, with Mr. Forsyth's permission, a map which was drawn up from Hari Chand's information. The inhabitants of Yārkand are a very mixed race. From information he received from the agent of Kashmir, who is stationed there, Mr. Forsyth estimates the population at about 60,000, as follows:—

Badakshan people	2000
Baltistan do.	2000
Kashmiris	1000
Andijanis or Kokandis	3000
Tunganis	500
Yārkandis	50,000

Of the Yārkandis, about 5000 are mendicants.

Many of the people have very marked Chinese features, and these, as a rule, have no beard, but only the moustache and imperial. No religion is tolerated except the Mahomedan, and caste prejudices, with the exception of such as exist amongst ourselves, are unknown. The few Hindus who have come over from India to trade are terribly kept down; they

are not allowed to wear turbans, to ride on horseback, or to intermarry with the Mahomedans. They go about in skull-caps, and long black robes tied with a rope round the waist; a particular locality in the city is appropriated to their use, and they pay much higher taxes than the Mahomedans do.

Slavery is said to have been abolished; but two slave boys belonging to the Governor, and apparently of Chinese descent, were in constant attendance at our quarters to keep the place tidy. In the city I never saw any females, with the exception of a few hopeless cases of sickness sent to me by the Dád Khwah for treatment; but in the villages we saw numbers of women. They were all dressed in white cotton robes, and a head-dress either of white cotton and of a globular shape, or a neat fur cap. As we approached they always disappeared; but we could often see numbers of pretty faces trying to get a sight of us through the chinks of the doors, or peeping over the enclosure walls.

The dress of the poorer classes consists of a turban, or simply a cap lined with sheepskin, one or more loose robes of cotton cloth of country manufacture, a pair of trousers of cotton or leather, made so wide that they go over the loose robe to protect the latter when the wearer is riding or working. The better classes wear the same style of dress, which only differs in the quality of the cloth, being generally made of silk, or of English or Russian cloth. Stockings are only worn by the wealthier classes. All wear boots, which usually come up to the knee. Those worn by the better classes are made of leather imported from India or Russia, and those of the poorer classes are of un-

tanned hide. I do not think that much tanning material is grown in the country. I was told of a plant called Tuchumack which yielded nuts or galls, used in preparing leather. At Sánju it was said to be common about Yārkand, and at Yārkand it was said to be plentiful at Sánju. All the leather used for boots or saddles was either of untanned hide, or had been imported from India or Russia.

On entering a room the boots are not taken off, as in India. The correct position during a visit of ceremony, or at meals, is to kneel and sit on the heels of the boots, or in fact in any position which does not show the feet in front. Without a deal of practice, however, the Yārkandi mode of sitting is most uncomfortable. One's legs soon take cramp, and the circulation becomes so interfered with, that one finds it difficult to stand on again rising up.

The great mass of the people seemed well to do and happy, and we saw no abject poverty, as in more civilized countries, for begging is looked on as an honourable profession. Most of our Mussulman attendants got married during our stay in the city, and some of them more than once, I believe, for, as in most Mahomedan countries, the Yārkandis allow of what are called nicka marriages — *i.e.*, marriages contracted for a limited period—a day, a week, a month, or more, as may be agreed on. The ceremony is performed by the kazi or judge. Some presents are given to the bride or her relatives, and at the end of the time agreed on both parties are free to separate, or they may if they choose prolong the matrimonial state.

The Yārkandis are, as a rule, remarkably cleanly

in their persons, their dress, and their houses; and dry-earth conservancy has been in use amongst them from time immemorial.

There is no coinage now, except the old Chinese coins. The price of most articles is estimated in *tungas*, one hundred tungas being equal to about twenty-four shillings; but the rate of exchange varies. The *kurus* or *yamboo* is a silver ingot, shaped somewhat like a wooden shoe, and it varies in value from 5*l.* to 16*l.*, according to weight. The *tilla* is another coin, worth about eleven shillings. The weights in common use are made of iron, and the balances are all on the principle of the steelyard.

The better classes use vessels of copper for cooking and at table, some of these are beautifully chased. I do not know how the poorer classes manage to cook, for the copper vessels are expensive. I do not think that zinc is known in the country, and brass is not made. The brass vessels of our Hindu servants were taken at first for gold.

I could not ascertain much regarding the diseases prevalent in the country, as villagers are scared by a large camp, particularly when the latter is accompanied by officials, and do not come freely for treatment. I doubt if intermittent fever exists. About every third man we saw, both rich and poor, was afflicted with goitre. Syphilis was reported by the native doctor to be common, but none of the cases presented themselves to me. Cataract was very common.

The Dád Khwah sent me a few cases to treat. One was an open cancer growing on the forehead, and almost as large as the man's head. Another was

a case of ovarian dropsy, almost moribund. Both cases were beyond treatment. There was almost no sickness amongst our camp followers, except in Kashmir, where all suffered more or less from fever, both going and returning. The only severe cases were on the march between Yārkand and Lé, when I had one case of pleurisy and another of pneumonia. It was remarkable that none of our men caught cold until we returned to Kashmir, when the change from a dry to a moist climate, even although the temperature rose considerably, brought on severe colds.

The manufactures of Yārkand are extremely limited, and are confined almost entirely to articles required for home use. Carpets, which are only of one or two patterns, and felt, form almost the only exceptions. The exports are gold-dust, which is obtained in great abundance about Khoten, by washing. Silk and extract of Indian hemp are largely exported. A good many horses also find their way to Kashmir and India, being brought by pilgrims on their way to Mecca, and sold as soon as the railway is reached. The imports are, cloth of all sorts, brocade, aniline dyes (which are in great favour), tea, sugar, leather, opium, and firearms. The trade in English fabrics, and particularly in Himalayan tea, is no doubt capable of enormous development by an improvement in the road. Even at present traders are said to clear at least cent. per cent. profit on all goods taken to Yārkand.

Yārkand offers a promising market for our Indian tea. Some improvement in the road, as just stated, is necessary, and arrangements for supplies of grain and fodder. The road is bad only at certain points, and

an outlay of five pounds a mile would improve them so much that one would be able to ride at a canter the whole way from Lé to Yārkand. Of course, to make a regular road, or what in India is considered a road, would cost millions of money, and more than the trade is worth. As to supplies, if the people between Lé and Yārkand were let off paying for their land, and men of some capital were encouraged to cultivate there, a very large quantity of grain and grass could be grown, and one or two depots for grain might be established. At Chágra and Gokra, for instance, there is plenty of culturable land, and plenty of water for irrigation. If the Yārkand authorities co-operated, fodder, and perhaps grain, could be grown in the Lower Karakásh valley. The trade has more than quadrupled in four years, simply by the establishment of an agency at Lé to prevent oppression by the Kashmir officials; and the improvements I have suggested would, I am convinced, again quadruple it, provided that peace and good government continue in Yārkand.

IX. THE RETURN JOURNEY.

On the return journey, as will be seen from the map, the expedition passed over a slightly different line of country. This march was a very uneventful one, except from its discomfort. On the 5th September we left the city and crossed the Yārkand river, now reduced to half the size it was thirteen days before.

Rosi Beg, a Mahomedan, accompanied us with a small escort; at each halt we had dastarkhans presented, and every mark of attention was shown us as

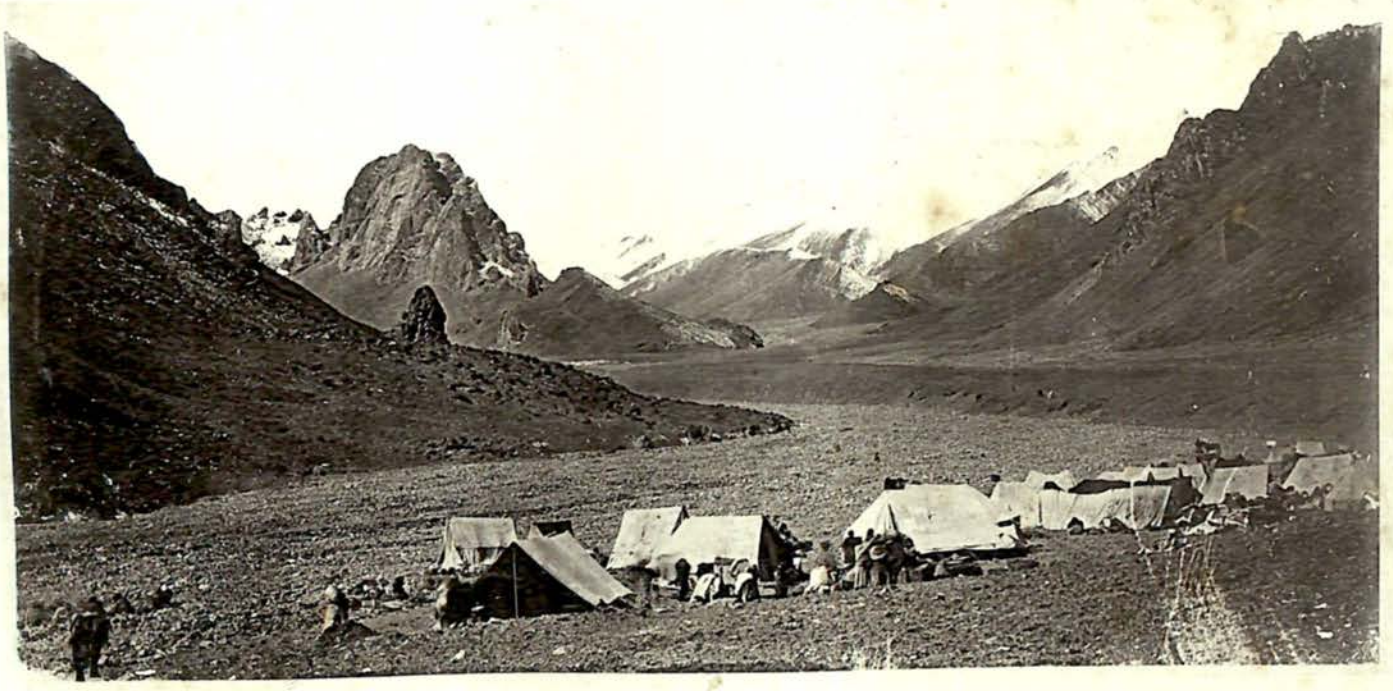
before—in fact, we were treated with more respect when leaving than we had been on our arrival. Every day Mr. Forsyth received a letter from the Dád Khwah, inquiring after our welfare, and these letters were always accompanied by a present; one day some silver ornaments, another day some horses. At Kargallik we met the Mir Sahib, who had a doleful tale to relate of the hardships his party had undergone after we left them at Lak Zung. At Sánju ten pack-horses formed the present. These delicate attentions, and the unbounded hospitality we received throughout our stay in the country, could not fail to leave a very good impression on our minds regarding the kindly feelings of the Yárkand rulers towards us and our Government.

The Sánju river was very much reduced in size, and we followed it up to Tám instead of going round by the Chu Chu pass. The march from Sánju to near Tám, about thirty-five miles, occupied us from sunrise until nine o'clock at night; it was one of the most trying marches I ever made, for the route lay along the bottom of a deep gorge, in the bed of a torrent, which had to be crossed and re-crossed every half-mile. When halting about mid-day at the village of Kibris, the villagers brought us some delicious "Devonshire" cream, which could hardly be distinguished from the genuine article. Here I came on fossiliferous rocks, which are shown in the section of the country already given.

By 9 P.M. we had got many miles ahead of all our baggage, and it was too dark to proceed farther; we therefore lighted a fire, and bivouacked for the night in the open, a tin of soup serving for dinner. Pre-

sently we heard the sound of some one approaching, and a man bearing a large bag on his head ran past towards Sánju. We called on him to stop, but he said he was the bearer of letters, and was in a hurry. On further questioning him, we found that he had all our letters and newspapers, which had been accumulating for a considerable time. The bag was of course opened forthwith, and we found materials to keep us reading until it was almost daylight. Here we first read some details of the Franco-Prussian war. Next day all our men and baggage came up safely. The Kirghiz then arrived, and took charge of our baggage, and carried it until we got over the Sánju pass.

Mr. Forsyth wished to reward the Kirghiz, as they had been remarkably civil and attentive, and had obtained no remuneration for all the trouble they had been put to on our account. It seems to be a rule in Yārkand that the people should carry, free of cost, all goods belonging to the king or his guests. On reaching Kitchik Yílák, it was accordingly intimated to the Kirghiz Akskall—*i.e.*, greybeard or chief, that we intended to pay them at the same rates as the traders, or at the rate of four shillings for each Yák load carried over the Pass. At this news they were all very much pleased; but an animated discussion soon arose, and after some trouble we ascertained that they were anxious to know if some tins of powder and other presents we had already given them, were to be included as part of the Yák hire. So to settle the question, a part of the money was at once handed over to them in the shape of a silver Koorus, worth about 16*l.* Our Mihmándár Rosi Beg, on learning



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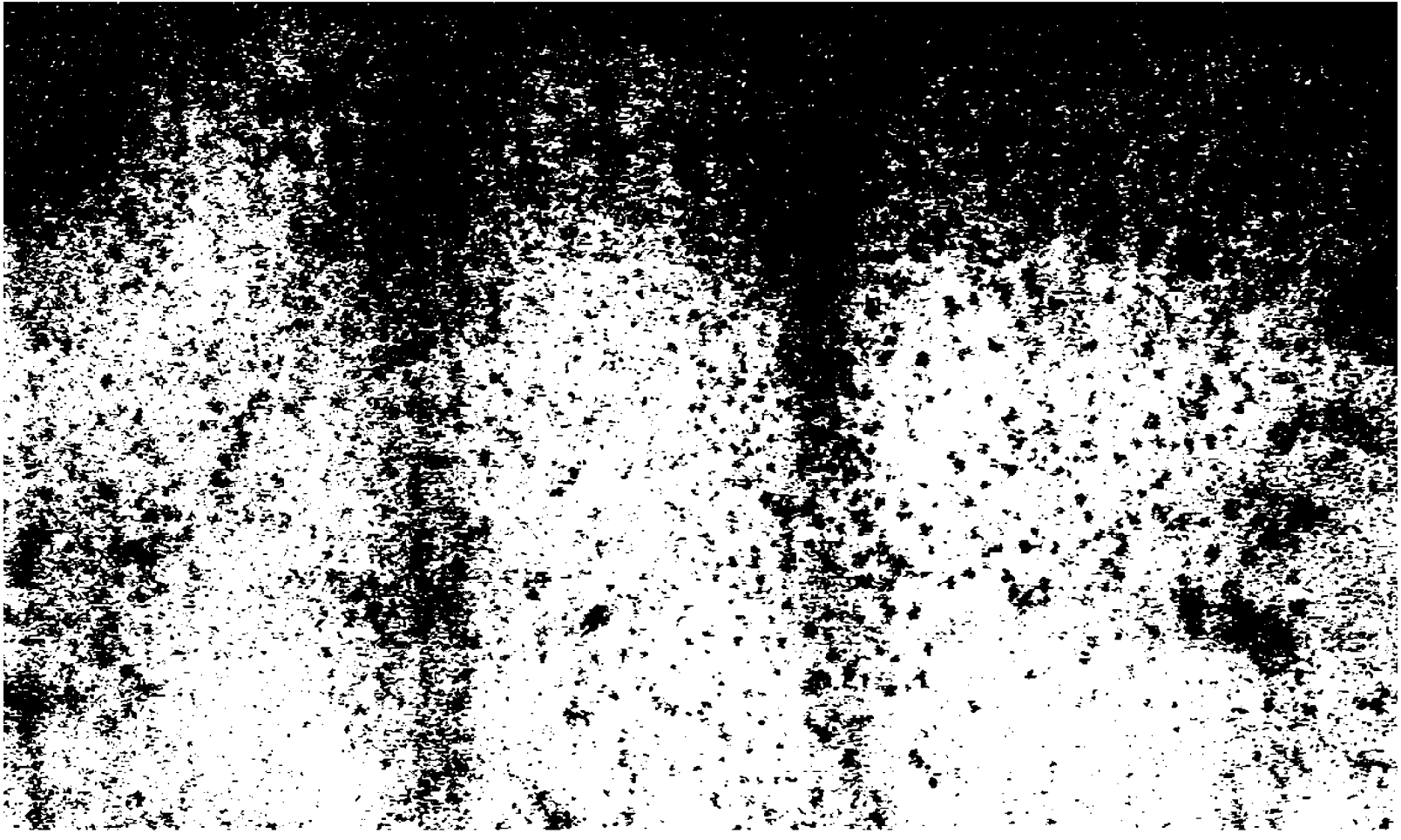
CAMP AT SHING LUNG, ON THE UPPER KARAKASH RIVER.

P. 46.



that the Kirghiz had taken this money, at once ordered them to return it; and a deputation came privately to our tents, and informed us of this order, but suggested that after coming in a body and returning the money, two of their number should go on with us for a march or two after Rosi Beg returned, and then have the money restored. This plan was adopted, and very soon all the Kirghiz came in a body to our tents, and in presence of Rosi Beg, with a great deal of palaver, returned the money. One old fellow, who spoke Persian, made a long speech. He said that it was impossible for them to take money from the guests of the King, &c., &c., &c., and therefore begged us to take back the money. Whilst making this speech, and with great solemnity placing the lump of silver at Mr. Forsyth's feet, he could hardly keep his gravity; and I suspect that Rosi Beg must have seen from the grimaces of the Kirghiz, that the whole thing was a hoax.

On arrival at Sháhidulla we found Mallik Kutub-ud-Dín with supplies and horses to take us to Ladák. I should here mention that the moment Mr. Forsyth ascertained with certainty that the king was absent, he sent a letter to Kutub-ud-Dín, who had been left at Lak Zung, and directed him at once to return to Ladák, and arrange for our return within twenty-five days from the date we moved from Kitchik Yílák towards Yārkand. This duty Kutub-ud-Dín performed so well, that as we came into camp a few miles north of Sháhidulla, Kutub-ud-Dín and his party met us with horses and all necessary supplies. We found the Tograsu and Karakásh rivers very much reduced in size, and very easily fordable. A few miles above

Sháhidulla we left the Karakásh valley and ascended a ravine which led to the Suket pass, and for two marches we followed the old Karakoram route. The Suket pass, 16,000 feet high, was covered with snow, and the temperature here fell so low that we all felt utterly powerless to do anything. My ink was constantly hard frozen, and on several occasions when I thawed it before the fire and attempted to write in my pencil notes, it froze at once on the point of the pen. Several times I tried to photograph, and once or twice succeeded, but usually the tepid water used for washing the plate froze as I poured it from the jug, and instantly destroyed the picture. After crossing the Suket pass we could see the Karakoram mountains twenty miles to the south, forming a wall of rugged snow-capped peaks across the horizon. As we approached these mountains they were found to consist of a series of ranges, and the water-sheds were interlaced *like* the teeth of a comb, to such an extent that one never could say in which direction a particular streamlet would ultimately run.

The Mir Sahib now left us to try the Karakoram route, whilst we made for the Karakásh river, a few marches below its source on the Lingzi Thang plains.

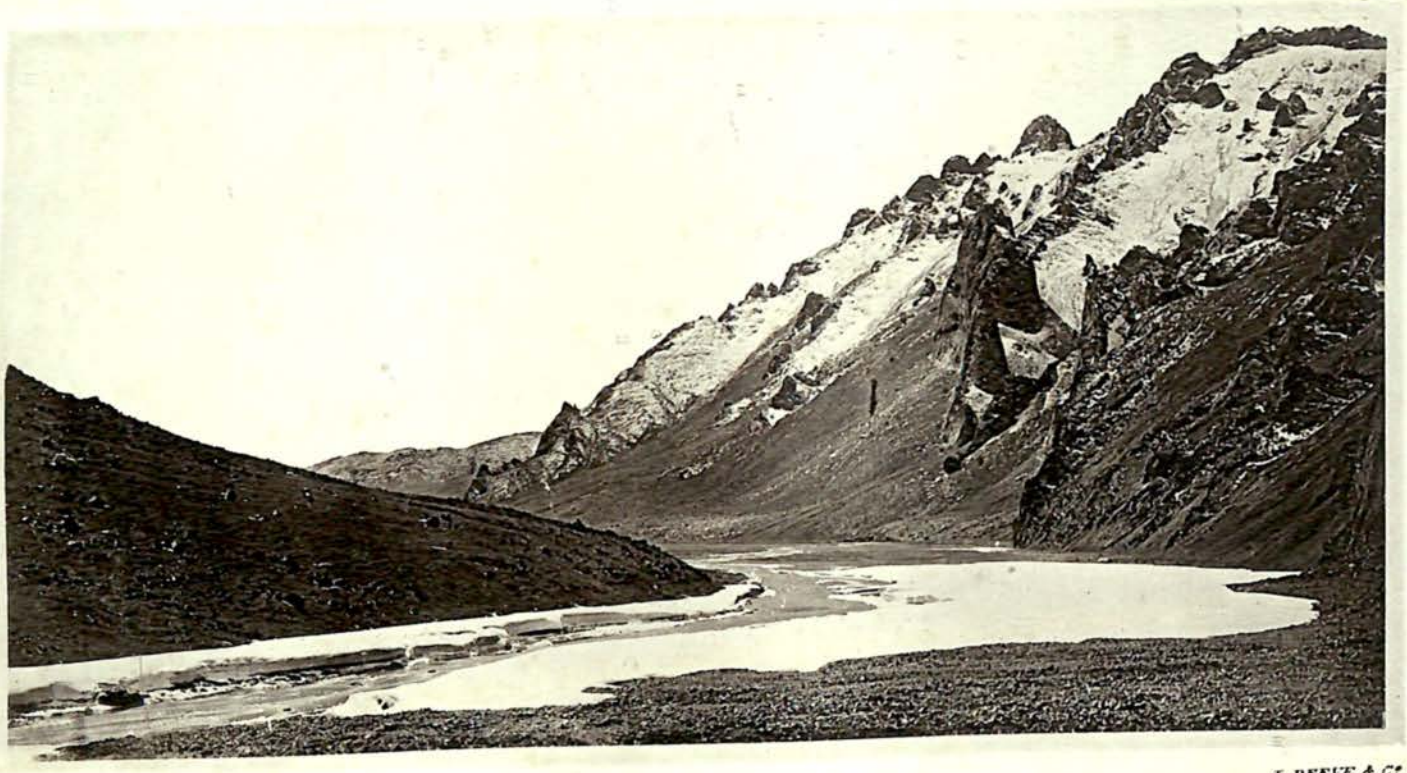
The 24th September was a day of suffering. We started to march over a desolate plain (altitude 16,000 feet), to a place said to be twelve miles distant. With such a short march before us we started late, and loitered a good deal on the way, and our tents were pitched when we arrived at the camping place; but we soon found that the grain deposited here was not anything like sufficient for our horses, and we had at once to strike our tents and go on twelve

miles farther, to a small lake at the foot of the hills. It was dark before the first of our party arrived at the second camp. On the way a storm of wind and snow-drift overtook us, and many of our followers did not turn up until next day, having to sleep wherever they could find a little shelter. The Káratág lake near which we encamped contained sweet water; it was about half a mile across, and close under the mountains. In the morning I here caught a quail and a rail completely exhausted. I have no doubt they were crossing from Yārkand to Tibet, or perhaps to India. Next day we crossed a low pass, and the day after got to the Karakásh river, which we followed to its source, through a desolate weird-looking valley. Our first camp in this valley was on a large open plain, ironically named by some former travellers Khush Maidán, which means "pleasant plain." One day, when our horses were completely exhausted, and we were eagerly looking out for patches of feed, snow fell to the depth of several inches and concealed all the grass, so that our horses had to starve, and on our next march many of them fairly broke down, and we had to halt for two days. In some places the Karakash river was narrow, and fordable with difficulty, owing to the number of quicksands; often there were high banks of ice on either side; in other places the whole valley was filled with one sheet of ice extending for miles, and occasionally the river disappeared entirely in the sand.

It is a curious circumstance that, with the thermometer always below the freezing point, the Karakash river should not have been entirely frozen up. We suffered intensely from the cold wind; and notwith-

standing every precaution, our hands and faces got so chapped that for weeks afterwards washing was a torture. The thermometer at night ranged from about the freezing point to twelve degrees below zero; and it was no slight addition to our discomfort that we had frequently to ford the river and get wet above the knee. On these occasions our clothes became coated with ice, and had to be thawed before we could venture to walk; even the legs and bellies of the horses became covered with icicles. Sometimes our beard had to be thawed, for the breath made it freeze into one rigid mass, which had often a very ludicrous appearance.

It is to me a mystery how our Tibetan porters managed to exist at all, yet I never heard them utter a complaint, and we got back to Ladák without the loss of a single follower or load of baggage. Mr. Shaw left us in Lingzi Thang, to explore the Shyok river, and the many hardships he had to undergo brought on a severe attack of rheumatic fever, which nearly cost him his life.



HELIOTYPE

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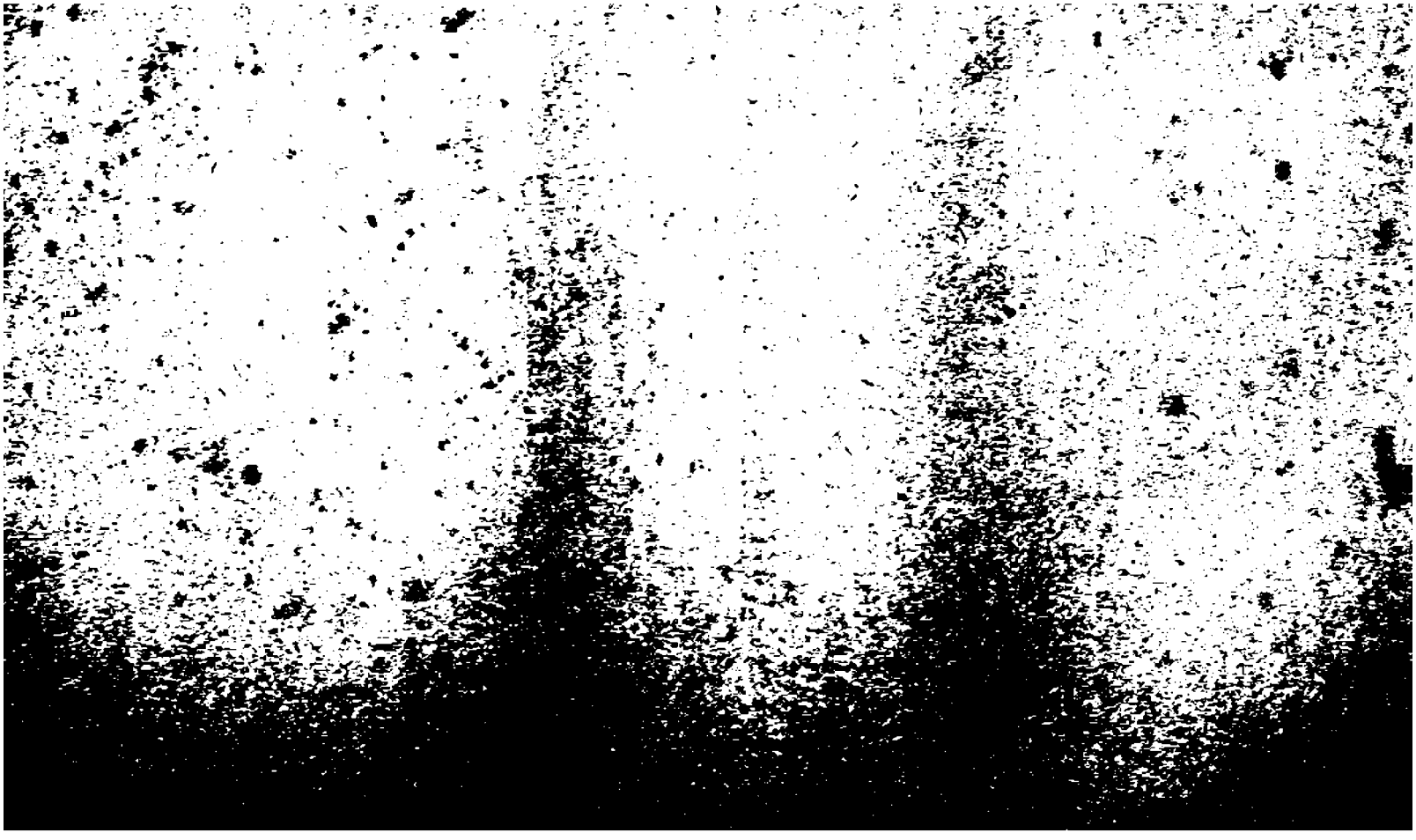
ICE BED ON THE KARAKASH.,

P. 150.

PART II.

NATURAL HISTORY.



PART II.—NATURAL HISTORY.

CHAPTER I.—ORNITHOLOGY.

I. RESUME OF THE ORNITHOLOGICAL RESULTS OF THE EXPEDITION.

By A. O. Hume.

The ornithological results of the Yārkand expedition, although not devoid of interest, have neither been so important nor conclusive as might perhaps have been expected. Almost from first to last the party were marching against time: the major portion of the route lay through the oft explored regions of Kashmīr and Ladák, and although the expedition remained *for some seven weeks* within the limits of Yārkand, five of these were occupied in painfully struggling through country, which was for the most part either higher than the summit of Mont Blanc, or else a veritable sandy desert, enlivened by but few oases. Thirteen days, it is true, were spent at the city of Yārkand *itself*, but there the absence of the king, Atalik Ghazí, and other political complications, rendered any personal exploration of the neighbourhood for the purpose of procuring natural history specimens absolutely impracticable.

Three-fourths of the specimens were preserved by the carbolic acid process, ("carbolized" as we call it) and *but for this*, many of the most valuable birds would have been lost to us, as they were obtained in elevated regions, where intense cold and the fatigue of the daily march rendered the skinning of any considerable number of specimens, and at times of even a single bird, absolutely out of the question.

Altogether, one hundred and fifty-eight species were observed, but of these only fifty-nine pertain to the orni-

thologically unknown hills and plains of Yārkand, and it is with the avi-fauna of these that I shall first deal.

Of these fifty-nine species, seven, viz.:—

8 bis Falco Hendersoni (Pl. I.)
*492 bis Saxicola Hendersoni (Pl. XIII.),
546 bis Suya albosuperciliaris (Pl. XVIII.),
679 bis Podoces Hendersoni (Pl. XXII.),
679 ter „ humilis (Pl. XXIII.),
769 ter Galerida magna (Pl. XXX.),
820 ter Caccabis pallidus,

are probably new to science; but of these one species, the last mentioned, is only doubtfully entitled to specific separation, and is connected with the allied *C. chukar*, by the pale Ladák form, for which I have, with much hesitation, proposed the name of *C. pallescens*.

Both these forms differ markedly from the Indian bird, but whether they are to be considered merely local races, or ranked as distinct species, is a matter in regard to which opinions will differ, and to my mind, is one of but little moment; they are quite as distinct I think as *C. græca* and *C. chukar*, but I am not personally prepared either to assert or deny the specific distinctness of the two last-named birds.

Of the other species, supposed to be new, one is a noble Falcon, differing somewhat in type from any of the known sub-groups, but possessing more or less marked affinity with the Gyr Falcons, the Lanners, and the Saker, and having a special interest both as forming a sort of connecting link

* The numbers prefixed to the species are those of Dr. Jerdon's "Birds of India," or, where the species is not included by him, of my M.S. catalogue, which embraces, besides those species described by him, all the birds discovered, or first observed in India, subsequent to the publication of Jerdon's work, as well as all the known birds of Ceylon, the Andamans and Nicobars, Burmah, Assam, and Eastern Bengal, Ladák and Tibet. For facility of reference, Dr. Jerdon's numbers (though I do not concur in the arrangement followed by him in many cases) have been for the present retained, and the other birds intercalated, as "bis," &c., where their natural or supposed affinities indicated. I have now, for the convenience of Indian ornithologists, to whom Yārkand will probably soon cease to be *terra incognita*, similarly intercalated the few peculiar Yārkand species as yet known to us.

between these three sub-genera, and as being, I believe, the much-talked-of but hitherto unknown "Shanghar" of eastern works on Falconry.*

Two belong to that remarkable Central Asiatic genus, *Podoces*, hitherto only represented, I believe, by a single species (*P. panderi*). From an examination of the two new species, as well as from what Dr. Henderson tells me of their habits, I have been led to suspect, that instead of being Jays, Crows, Magpies, or Choughs, as they have been at one time or another considered by different authors, these Thrush-Choughs may possibly be only very aberrant members of the great Timaline group.

There is a large crested Steppe-lark which appears to me to differ from any yet described, and which may in some respects be considered a connecting link between *Galerita* and *Certhilauda*.

A Stone-chat of the *S. atrogularis* type, and a well-marked species of the Drymœcine group, which I have for the present assigned to the hitherto exclusively Himalayan genus *Suya*, complete our short list of novelties, all of which are probably permanent residents of and breed of Yārkand.

Twenty-nine species are widely distributed over the Old World, in the northern hemisphere, chiefly in the temperate zone, viz.:—

7 Gypactus barbatus.
*13 Hypotriorchis subbuteo.
*17 Tinnunculus alaudarius.
**42 Haliactus leucoryphus.
*82 Hirundo rustica.
*91 Cotyle rupestris.
125 Coracias garrula.
*254 Upupa epops.
351 bis Monticola saxatilis.
*483 Pratincola rubicola.
*514 Cyanecula suecica.

* This species, named by me *Falco Hendersoni*, has since been determined by Dr. Jerdon and Mr. Gurney to be *F. milvipes* of Hodgson. I am not quite certain that this identification is correct.

*583 Sylvia curruca.
*597 Pipastes trivialis.
679 Fregilus graculus.
*681 Sturnus vulgaris.
710 Passer montanus.
792 bis Turtur auritus.
**829 Coturnix communis.
*851 Vanellus cristatus.
*860 Strepsilas interpres.
*880 Philomachus pugnax.
*882 Tringa subarquata
*885 „ Temmincki.
*892 Actitis ochropus.
*894 Totanus glottis.
**910 Porzana pygmæa.
*954 Casarca rutila.
*986 Sterna fluviatilis.
**988 Sternula minuta.

Of the above, those to which a single asterisk (*) is prefixed are winter visitants to the plains and coasts of Hindustan; while those preceded by a double asterisk (**) are permanent residents, and breed in some parts, at any rate, of the plains of India.

Nos. 7 and 679, though never extending to the plains, are permanent residents throughout the Himalayas. Nos. 125 and 710 are seasonal visitants, respectively to the Western and Eastern portions of the Himalayas; while 351 bis occurs as a rare straggler, far in the interior in the Central portion of the mountains.

Turtur auritus has never, I believe, been recorded from any portion of our hills. Every one of these thirty species except *Strepsilas interpres*, *Totanus glottis*, and *Tringa Temmincki*, is believed to breed in the hills or plains of Yārkand.

Nine species are perhaps best known as Indian, viz.:—

56 Milvus govinda.
*261 Lanius cristatus.
470 Oriolus kundoo (Pl. XI.).

492 Saxicola atrogularis.
554 Phylloscopus tristis.
560 „ viridanus (Pl. XIX.).
*590 Motacilla luzoniensis.
591 „ personata.
*920 Melanopelargus episcopus.

The first, third, and last are also permanent residents of the plains of India, and breed with us; those to which an asterisk (*) is prefixed range out of India to Burmah, and in the case of *M. luzoniensis*, at any rate, to China and the Philippines. *P. tristis* is said to be identical with the *P. brevirostris* of Strickland, and it may be so, but I have been unable to satisfy myself of the fact; the only specimens that I have examined, sent from Palestine as *P. brevirostris*, appeared to me to be separable from the Indian bird. As for *Melanopelargus episcopus*, it is found in Burmah, Java, Borneo, Celebes, &c.; and in Africa, from Nubia to Caffraria.

It is probable that all these species breed in Yārkand.

Ten species appear to be almost peculiar to the central or central and western sections of that vast belt of mountain ranges which, under various appellations—*e.g.*, the Kara Koram, the Hindoo Koosh, the Himalayas, the Kuen Lun, &c., stretches, though not without breaks, right across the continent of Asia, viz.:—

499 Ruticilla erythrogastra.
654 Accentor strophiatus.
658 Corvus tibetanus.
661 „ intermedius.
668 Pica bactriana.
737 Carpodacus rubicilla.
751 Linota brevirostris (Pl. XXVI.).
802 bis Syrrhaptes tibetanus.
816 Tetraogallus himalayanus.
816 bis „ tibetanus.

Not one of these species, so far as I know, occurs further east than Bhotan. *Pica bactriana* is replaced even in

Sikhim by the more eastern *P. bottanensis*, while all but *R. erythrogastra* and *C. rubicilla* (also recorded from the Altai and Caucasus) appear to give place west of Afghanistan to more or less nearly allied species.

Ruticilla erythrogastra, *Accentor strophiatus*, and *Carpodacus rubicilla* all breed in Yārkand, as was proved by the nestlings there obtained; but the first, at any rate, breeds also in Ladák.

The rest breed probably both in Ladák and Yārkand, while one of them, *Corvus intermedius*, breeds all over the Himalayas, at heights of from 5000 to 10,000 feet, and possibly a good deal higher.

There is yet another bird:—

496 bis Ruticilla erythroprocta, Gould,

(very common in Ladák likewise during the summer) which, if really distinct, should be included in the above list, but, as I shall show when dealing with it separately, there are strong grounds for believing that this form is nothing more than the full breeding plumage of *R. rufiventris*, and in that case the species should find a place in the previous list, with *Milvus govinda*, &c.

Two species, viz.:—

845 Charadrius longipes,
847 Ægialitis mongolicus,

occur almost throughout the whole continent of Asia, the latter of the two at any rate straying into Eastern Europe. Both species breed in Yārkand.

There remains a single species:—

646 bis Parus cyanus,

essentially a northern form, Asiatic and European, but straggling in winter into central and southern Russia and Germany. I am not aware that this species has hitherto even been obtained in summer, so far south as the Arpalak river, Yārkand, (lat. 37° N.), where it had obviously been breeding and where a scarcely fledged nestling was obtained.

Limited as our materials are, it seems to me that they point to the conclusion, that although visited by numbers

of northern and southern Asiatic forms, central Asia possesses a distinct resident avi-fauna, probably somewhat limited in extent, but doubtless altogether inadequately represented by the few forms as yet discovered.

With the birds of Siberia and the Amoor Land the writings of Pallas, Middendorf, Von Schrenk, and Radde, have made us fairly acquainted; while those of India, from the sea to the borders of Chinese Tartary and Thibet, have been, I believe with the exception of some small Grass-Warblers, or rare stragglers, for the most part recorded. Many Siberian and Indian species are identical, birds that inhabit the one country during one part of the year, straying or regularly migrating at other seasons into the nearest portions of the other; many of these also occur as might have been expected in Yārkand. Several of our species that do not find their way so far north as Siberia, resort to Yārkand for the summer, or possibly in some cases reside there permanently, while one at least of the more northern forms that never go so far south as the Himalayas finds even during the hot season a home in that country; but over and above these we have traces of a distinct and local avi-fauna which neither in summer extends to Siberia, nor in winter to the mountains even of India.

It may be thought that the limited number of the peculiar Yārkand species as yet discovered scarcely warrants a belief in the existence of a distinct Central Asiatic avi-fauna, but if the very small area actually explored be borne in mind, as also the fact that few as were the species observed, more than one tenth of these are unknown to both the northern and southern sections of the continent, I think it will be admitted that the conclusion is not altogether unreasonable.

Europe presents us with no parallel case; it would be impossible, probably, to point to any district in that continent inhabited by even six peculiar *bonâ-fide* species, which occur neither to the north or south; but in Africa it appears to me that we find a somewhat similar region possessing likewise a peculiar avi-fauna — an elevated tableland, much of it a perfect desert, hemmed in by

mountains, and probably at a comparatively recent geological period the bed of a vast inland sea.

Unfortunately we know too little of the Yārkand fauna to hazard more than a conjecture as to its affinities. *Podoces* is a type *per se*, the only previously known species being an inhabitant of Central Asia. The Falcon is a link between African and Arctic types, a desert Gyr-falcon. Its Crested Steppe-lark is perhaps nearest to Arabian and African forms. Its Stone-chat is equally north African, south European, and south-western Asiatic. Its Wren Warbler, though possibly rightly assigned to a Himalayan genus, is very African in its type, and its Redlegged Partridge, though probably most resembling the south Arabian form (*C. arenarius*, nobis) is quite as nearly allied to our Norfolk bird as to the southern Himalayan form, with which, however, the intermediate Ladák race seems to connect it. On the whole, so far as the very scanty evidence before us justifies a conclusion, I should expect that further researches would prove the peculiar Yārkand avi-fauna to consist partly of forms most nearly related to north-east African and Arabian types, and partly of locally specialised groups unknown elsewhere.

In Yārkand we have found one at least of the breeding haunts of numbers of our Indian winter visitants, whose nests and eggs have hitherto been vainly sought for in the Himalayas, and of which, though some few individuals doubtless bred there, the great mass went, as we knew, farther north in summer.

What became of the vast multitudes of *Cyanecula suecica, Sylvia curruca, Pipastes trivialis, Philomachus pugnax, Tringa subarquata*, and *T. Temmincki, Actitis ochropus, Totanus glottis, Lanius cristatus, Phylloscopus tristis*, and *P. viridanus*, &c., &c., which during the cold season swarm over the whole face of the country, has always been a puzzle? We now find that Yārkand is one, at any rate, of their favourite summer retreats, and that a belt of absolute desert, more than 100 miles in width, having an elevation of over 15,000 feet, and intersected by numerous more or less snow-capped ridges, the lowest passes over which attain an

altitude of 18,000 feet above the sea level, opposes no invincible obstacle to the periodical migration of even the tiniest and most feeble-winged of our songsters.

It is startling to think of birds like the *Phylloscopi*, ill adapted as they seem for lengthened flights, and, when not migrating, rarely flying more than a few yards at a time, yearly travelling from Yārkand to Southern India and back again. How these butterfly-like mites brave in safety the vast stretches of almost Arctic deserts—absolutely devoid of vegetation, where the thermometer habitually varies 50° in twelve hours, and a breeze springing up sends the mercury down far below zero and freezes men, horses, and even yaks, it is alleged, in a few hours, is verily a mystery. Some may, perhaps, incline to believe that these little tree-warblers do not make this arduous migration, and that these vast mountain ranges, doubtless of geologically recent elevation, only assumed their present dimensions subsequent to the creation or specialization of these species; but although no specimen of these was actually caught in the act of migration, I do not think, considering the number of species that were thus observed, as also that *Reguloides proregulus* and other equally feeble birds do almost certainly make this same and even a longer journey, that this explanation can be accepted. I think, moreover, that in the *Podoces* and other species we have indications of the lapse of a quite sufficient period since the isolation of Central Asia to render probable a marked modification of all pre-existing forms which have since continued to reside there as permanent inhabitants; and if these *Phylloscopi* did *not* yearly cross and recross the Hills, I doubt much whether the species found on both sides would now be identical.

Of the Common Quail a few breed within our limits, and of the Common Starling many breed in Kashmir; but these are wholly inadequate to account for the incalculable myriads of these species which periodically visit us, and of these it is now probable that Yārkand furnishes us with a large quota. The Quail captured on the 24th September in an utterly exhausted state at the Káratág Lake, at an

altitude of over 13,500 feet, was doubtless on his return journey to India, and had for a companion in his misfortune, if not in his journey, a Rail (*Porzana maruetta*) equally exhausted, who must also have been migrating, as the lake lies in a bare shingle desert, almost entirely destitute of vegetation.

These two poor travellers, it would seem, stopped to have a drink, and, as is not uncommon in such cases, "came to grief."

In the desert steppes that commence about a march above the Pangong Lake, and form a sort of neutral ground between Ladák and Yārkand, we meet, as might be expected, with scarcely any animal life.

Chance travellers, migrating like the Rail or the Quail already noticed—*Butalis grisola, Cyanecula suecica, Motacilla luzoniensis, Palumbæna Eversmanni, Actitis hypoleucus,* and *Queryquedula crecca*—were doubtless obtained in these inhospitable and frigid wastes, and the Thibetan Raven travelled with the camp throughout; but the only species that appeared to be even seasonal residents were the Lammergeier, the Hoopoe, *Montifringilla hæmatopygia, Ægialitis mongolicus,* and *Casarca rutila.* As for the Hoopoe, he was met with everywhere, in the barest deserts and on the highest passes, busy pegging his long bill into the sand, wholly unconcerned at the desolate loneness of the surrounding scene, and apparently perfectly unaffected by a temperature often falling during the night many degrees below zero (Fahrenheit). The entire absence of the larger Raptorial birds, and specially of true Vultures, is a marked feature in these steppes; the whole line of march was strewed with dead horses, yet not a Vulture was ever seen, nor indeed were any traces of Foxes or Wolves, such as are constantly met with in Ladák, observed at any time.

When a horse is unable to proceed the owners cut its throat, and, to enable its flesh to be used by future travellers whose provisions run short, cut long steaks out of the haunches, and lay them on stones or hang them on any dwarf bushes that may chance to be near, and there they hang and harden, the atmosphere being too dry to admit of

putrefaction, unmolested by bird or beast, until devoured by some famished band of traders, or until they crumble into dust. When a camp is moving the attendant Ravens of course may help themselves, but these wise birds are far too "canny" to take up their quarters in such uninhabitable regions, and only visit them in company with men who will afford them the luxury of a stolen meal. I have a shrewd suspicion that to the Raven, as to some of the higher members of the animal kingdom, stolen things are ever sweetest.

One of the points which the observations of Dr. Henderson has most impressed me with, is the great altitudes at which many species of birds seem perfectly at their ease. Our familiar friend the Cuckoo was seen swinging in the breeze on the pendant branches of a birch, trolling his "jocund lay" at a height of 11,000 feet, while the snow lay all around. The Hoopoe was quite at home at 18,000 feet, the so-called Kashmir Dipper, a resident at over 15,000 feet, busy seeking insects in a stream more than half of which was congealed into solid ice; Guldenstadt's Redstart was hopping unconcerned on the snow at 17,800 feet; *Montifringilla hæmatopygia* seems to live permanently at heights of from 17,000 to 14,000 feet, below which Adams's Finch is common at 13,000 feet. The Long-billed Horned Lark ranges in all suitable localities from 12,000 to 15,000 feet, while both the Mongolian Dottrel and the Ruddy Shieldrake breed at 16,000 feet, and the brown-headed Gull (*X. brunneicephala*) at 15,000 feet. I do not know whether it has ever been observed how sharply the first high snowy range of the Himalayas defines the area of distribution of a large proportion of the species resident within those hills. Numbers of species occur south of the first snowy range, from Murree to Darjeeling, which, except where some large river breaking through the range enables them to creep a short distance up its valley, are never found north of that line. Numbers again abound throughout the midland Himalayas which are never found south of that range, although apparently localities precisely similar to those in which they reside are there to be met with.

These facts are often explained by the assumption that the birds cannot cross the range, but with the experience we now have of the manner in which the feeblest species traverse the most elevated regions, this explanation can scarcely be maintained. In reality I believe that this sharp definition of specific range is due to the equally sharp definition of climate which is effected by these great ridges. The birds *could* get over them easily enough, but the moisture-laden clouds from the Indian Ocean and the Bay of Bengal *cannot*. Hence south of the range we have a comparatively moist climate and more or less heavy periodical rains; while north of it we have an excessively dry climate, varied only by occasional showers, or violent but almost rainless thunderstorms. South of the range we have luxuriant vegetation; north of it a scanty, stunted flora. There are exceptions, but this is the rule; and to this result of a difference in the hydrometric state of the atmosphere, and to that difference itself, I attribute the rigid limitation by the first high snowy range in the area of distribution of so many species.

Of the great bulk of the species obtained in Ladák, Kashmir, and the low hills leading from the plains to Kashmir, with whose avi-fauna we are comparatively familiar, no detailed notice seems here necessary; each will be separately dealt with in the next chapter. It may not be out of place, however, to notice that a Buzzard was obtained on the road from Kashmir to the plains, answering completely to Hodgson's and Blyth's description of *Buteo aquilinus* (and exhibiting in a marked degree the supposed specific characteristics of this species, the reticulate scaled tarsus feathered for two-thirds of its length); which, however, after comparison with a vast series of *Buteo ferox*, I believe to belong to that species. The subject is further discussed in Chap. II.

In Kashmir several specimens of a Laughing Thrush were obtained, nearly allied to *T. variegatum*, of which I had already received others from the Agrore Valley, and which I have now, with much hesitation, separated as *T. simile* [Pl. VII.]

A species of Starling which I long since separated as

Sturnus nitens, was obtained in great numbers in Kashmir, and as all the specimens are precisely similar, and exactly agree with those previously collected by myself, I have, as Mr. Gladstone would say, "ventured" to figure [Pl. XXIV.], and publish it as distinct. It is of the *S. unicolor* type, but much smaller and far more brightly coloured. It is, so far as I yet know, confined to Kashmir, Afghanistan, and the Peshâwar Valley.

In Ladák *Saxicola atrogularis* was obtained in full breeding plumage (figured by Gould as *Saxicola montana*), as well as in intermediate stages, leaving, to my mind, no doubt as to the necessity of suppressing this latter supposed species.

Accentor nipalensis was met with at the Pangong Lake. This is by no means, as seems to have been supposed, a purely eastern form; it is common in winter in the valley of the Sutlej, at least as far down as Kotegurh. The Robin Accentor (*A. rubeculoides*), again, also assigned by Gould and Jerdon to Nepaul alone, was abundant in October throughout Ladák; but for further particulars of this, and all the other species observed by the Expedition, I must refer the reader to the next chapter.

Dr. Henderson, in his remarks on the physical aspect of the countries traversed by the Expedition, has divided the route into six sections, each characterized by distinct natural features; and in accordance with his division, I have prepared a table, which will be found below, showing in which of these several sections each species was observed, and indicating also from which of the other sections (although not there noticed by Dr. Henderson) I have received specimens of it.

I feel that in these brief remarks I have done but scant justice to the materials which my kind friend Dr. Henderson so laboriously amassed; but with half my museum packed up and at a distance, with very few works of reference at hand, with but a few weeks in which to do the work, and with my time already fully occupied with public duties, I have been unable to do better, and can only crave the indulgence of brother ornithologists for the crude and imperfect account which I have presented.

TABLE *showing the Distribution of the Species observed by the Yārkand Expedition.*

(e) signifies that the species was observed by the Expedition.

(o) signifies that, although not observed by the Expedition, specimens have been procured in the locality by other observers.

Species believed to be new, and of which full descriptions and figures are given in ch. ii. *et seq., are printed in capitals.*

Species which, though not new, have, it is believed, as yet not been satisfactorily figured, and of which figures are given, are printed in antique (thick) type.

Species which, although neither new nor unfigured, are not described by Dr. Jerdon, and of which full descriptions and measurements are given, are printed in Italics.

Species which, though possibly new, are only described and are not figured, because it is doubtful whether they are entitled to specific separation, are printed in black letter.

No. in Jerdon, or, where not noticed by Jerdon, in Hume's catalogue.	NAME.	Panjāb (between Jamu and Kashmir).	Kashmir (to the Zoji-lá Pass).	Ladák (to one march beyond the Pangong Lake).	Desert steppes (to the Karakash Valley).	Eastern Yārkand (from the Karakash Valley to Sanju).	Plains of Yārkand.
7	Gypaetus barbatus	*e*	*e*	*e*	*e*	*e*	
8 *bis*	FALCO HENDERSONI	...	...	...	...	*e*	
13	Hypotriorchis subbuteo	*o*	*o*	*o*	...	...	*e*
17	Tinnunculus alaudarius	*e*	*o*	*e*	...	...	*e*
42	Haliaetus leucoryphus	*o*	...	...	...	...	*e*
46	Buteo aquilinus	*e*					
56	Milvus govinda	*e*	*e*	*e*	...	*e*	*e*
82	Hirundo rustica	*o*	*e*	...	...	...	*e*
91	Cotyle rupestris	*o*	*o*	*e*	...	*e*	
125	Coracias garrula	*o*	*e*	...	...	...	*e*
129	Halcyon smyrnensis	*e*					
134	Alcedo bengalensis	*o*	*e*				
136	Ceryle rudis	*o*	*e*				
154	Picus himalayanus	*o*	*e*				
199	Cuculus canorus	*e*	*e*				
243 *bis*	*Certhia familiaris*	...	*e*				
247	Tichodroma muraria	*e*	*e*	*e*			
249	Sitta leucopsis	...	*e*				
254	Upupa epops	*e*	*e*	*e*	*e*	*e*	*e*
257	Lanius erythronotus	*e*	*e*				
261	,, cristatus	...	..	...	...	...	*e*
262	,, arenarius	*e*					
273	Pericrocotus brevirostris	*e*	*e*				
288	Tchitrea paradisi	*o*	*e*				
298	Hemichelidon fuliginosa	*o*	*e*				
299 *bis*	*Butalis grisola*	...	...	...	*e*		
301	Eumyias melanops	*o*	*e*				
333	Troglodytes nipalensis	...	*e*				
341	Hodgsonius phœnicuroides	...	*e*				
343	Myiophonus Temminckii	*e*	*e*				
347	Cinclus asiaticus	*o*	*e*				
348	,, cashmiriensis	...	*o* ?	*e*			
349	,, sordidus		*o* ?	*e*			
351	Monticola cyana	*o*	*o*	*e*			

No. in Jerdon, or, where not noticed by Jerdon, in Hume's catalogue.	NAME.	Punjáb (between Jamu and Kashmir).	Kashmir (to the Zojilá Pass).	Ladák (to one march beyond the Pangong Lake).	Desert steppes (to the Karakash Valley).	Hill Yárkand from the Karakash Valley to Sanju.	Plains of Yárkand.
351 *bis*	*Monticola saxatilis*		...	o	...	e	
356	Geocichla unicolor	o	e				
365	Planesticus atrogularis	o	e	e			
418 *bis*	Trochalopteron similis	...	e				
425	,, lineatum	...	e				
438	**Chattarrhæa caudata**	e	o				
444	Hypsipetes psaroides	e	e				
458	Otocompsa leucogenys	o	e				
470	**Oriolus kundoo**	e	e	...	...	...	e
475	Copsychus saularis	e	o				
483	Pratincola rubicola	e	e	...	...	e	
486	,, ferrea	e	o				
492	Saxicola atrogularis	o	o	e	...	e	e
492 *bis*	,, Hendersoni	...	...	...	...	e	e
490 *bis*	*Ruticilla* { *frufiventris*, breeding plumage / *erythroprocta* }	...	...	e	...	e	
499	,, erythrogaster	...	o	e	...	e	
503	,, frontalis	...	e				
*504	,, cœruleocephala	e	e				
505	,, fuliginosa	e	o				
506	Chæmorrornis leucocephala	e	o				
514	Cyanecula suecica	o	o	...	e	e	
515	**Acrocephalus brunnescens**	o	e				
544	**Drymoipus longicaudatus**	e					
546 *bis*	Suya albosuperciliaris	...	...	...	...	...	e
554	Phylloscopus tristis	o	o	e	...	e	
560	,, viridanus	o	o	...	...	e	
566	Reguloides proregulus	o	e				
572	**Abrornis xanthoschistos**	e	e				
583	Sylvia curruca	o	o	...	...	...	e
584	Henicurus maculatus	e	o				
590	Motacilla luzoniensis	...	...	e	e	e	
591	,, personata	o	o	...	...	...	e
592	Calobates sulphurea	o	o	e			
594	Budytes citreoloides	o	e	e			
597	Pipastes trivialis	o	o	...	...	...	e
604	**Agrodroma Jerdoni**	e	o				
640	Lophophanes rufonuchalis	...	e				
644	Parus monticolus	o	e				
645	,, cinereus	o	e				
646 *bis*	,, *cyanus*	...	...	...	...	e	
652	Accentor nipalensis	...	...	e			
654	,, strophiatus	...	...	...	...	e	
656	,, rubeculoides	...	...	e			
658	Corvus tibetanus	...	...	e	e	e	e
661	,, intermedius	o	e	e			e
665	Coloeus monedula	e	e				
667	Nucifraga multipunctata	...	e				
668 *bis*	*Pica bactriana*	...	...	e	...	e!	
669	Garrulus bispecularis	e	e				

* Female only figured.

No. in Jerdon, or, where not noticed by Jerdon, in Hume's catalogue.	NAME.	Panjáb (between Jamu and Kashmir).	Kashmir (to the Zojí-lá Pass).	Ladák (to one march beyond the Pangong Lake).	Desert steppes (to the Karakash Valley).	Hill Yárkand from the Karakash Valley to Sanju.	Plains of Yárkand.
672	Urocissa flavirostris	c	c				
679	Fregilus graculus	...	c	c	...	c	
679 *bis*	PODOCES HENDERSONI	...	...	...	...	...	c
679 *tris*	,, HUMILIS	...	...	...	...	c	
680	Pyrrhocorax alpinus	...	c	c			
681	Sturnus vulgaris	o	o	...	...	...	c
682 *bis*	,, NITENS	o	c				
684	Acridotheres tristis	c	c				
706	Passer indicus	c	c	c			
708	Passer cinnamomeus	...	c				
710	,, montanus	...	...	...	...	...	c
712	Emberiza leucocephala	...	c				
713	,, cia	c	c	o?			
725	Hesperiphona icteroides	...	c				
732	Pyrrhula aurantiaca	...	c				
737	Carpodacus rubicilla	...	...	c	...	c	
738	,, erythrinus	o	c	c			
741	Propasser rhodochlamys	...	o	c			
751	Metoponia pusilla	...	...	c			
751 *bis*	*Linota brevirostris*	...	...	...	..	c	
752 *bis*	*Montifringilla hæmatopygia*	...	...	c	c		
752 *tris*	,, *Adamsi*	...	...	c			
753	Fringilauda nemoricola	..	c	c			
761	Calandrella brachydactyla	o	c	c	c		
761 *tris*	Melanocorypha torquata	c					
764	Otocoris longirostris	...	...	c	c		
766	Alauda triborhyncha	..	...	c			
767	,, gulgula	c	c				
769 *tris*	GALERIDA MAGNA	...	...	...	...	...	c
778	Sphenocercus sphenurus	c					
787	Palumbœna Eversmanni	o	o	c	c		
788 *bis*	Columba neglecta	...	o	c			
789	,, rupicola	...	...	c	c		
790	,, leuconota	...	...	c			
792	Turtur vitticollis	o	c				
792 *bis*	,, *auritus*	...	...	...	...	..	c
802 *bis*	*Syrrhaptes tibetanus*	..	...	c	c	c	
816	Tetraogallus himalayanus	...	...	o	...	c	
816 *bis*	,, *tibetanus*	...	...	c	...	c	
820 *bis*	Caccabis pallescens	...	...	c			
820 *tris*	Caccabis pallidus	...	...	...	...	c	
829	Coturnix communis	o	o	...	c	...	c
845	Charadrius fulvus	o	o	...	...	...	c
847	Ægialitis mongolicus	...	...	...	c	c	
851	Vanellus cristatus	o	o	...	...	...	c
860	Strepsilas interpres	...	...	...	...	...	c
869	Gallinago solitaria	o	o	c			
880	Philomachus pugnax	o	o	...	...	...	c
882	Tringa subarquata	...	...	...	...	...	c
885	,, Temminckii	o	o	...	...	...	c
892	Actitis ochropus	o	o	...	...	...	c
893	Actitis hypoleucos	o	c	...	c		

No. in Jerdon, or, where not noticed by Jerdon, in Hume's catalogue.	NAME.	Panjáb (between Jamu and Kashmir).	Kashmir (to the Zójí-lá Pass).	Ladák (to one march beyond the Pangong Lake).	Desert steppes (to the Karakash Valley).	Hill Yarkand from the Karakash Valley to Sanju).	Plains of Yarkand.
894	Totanus glottis	o	o	...	...	...	e
901	Hydrophasianus sinensis	o	e				
903	Fulica atra	o	e	e			
905	Gallinula chloropus	o	c				
909	Porzana maruetta	...	o	...	e		
910	„ pygmæa	o	o	...	...	e	
920	Melanopelargus episcopus	o	...	...	...	...	e
923	Ardea cinerea	o	c				
935	Ardetta minuta	...	c				
937	Nycticorax griseus	o	c				
954	Casarca rutila	o	o	...	e	e	
961	Chaulelasmus streperus	o	e				
964	Querquedula crecca	o	o	e	e		
969	Aythya nyroca	o	e				
972	Mergus castor	...	..	e			
975	Podiceps minor	o	e				
978 *bis*	*Larus argentatus*	...	e				
980	Xema brunneicephala	...	...	e			
981	„ ridibunda	...	c				
984	Hydrochelidon indica	...	e				
986	Sterna fluviatilis	...	...	...	...	...	e
988	Sternula minuta	o	o	...	...	...	e

Species not observed by the Expedition, but figured in this work.

158 **Picus scindianus**
439 **Chatterhæa earlii**
543 **Drymoipus inornatus**
573 **Abrornis albosuperciliaris**
297 **Alseonax latirostris**

ORNITHOLOGY—*continued.*

II. DETAILED LIST OF THE BIRDS OBSERVED BY THE YARKAND EXPEDITION.

By G. Henderson and A. O. Hume.

The numbers prefixed are those of Dr. Jerdon's work on the Birds of India, or, where the species is not included in this latter, of Hume's Catalogue. Each author is responsible for the observations to which his initials are appended.

7. Gypaetus barbatus (Linn.).

This bird was seen every day from Jamu to the plains of Yārkand and Sanju. It was the only large raptorial bird noticed beyond Lé, and on the Lingzi Thang plateau almost the only living creature except a species of Antelope, of which no specimens were obtained. It was usually observed at sunrise, perched on some precipitous cliff until the sun was well up and the air grew warm, when it commenced sailing along the faces of the cliffs, passing and repassing the same spot; generally, however, they were in pairs, keeping near to each other. There is usually a pair to be seen near every village in Ladák. From Lé to Sanju the whole route is strewn with dead horses in various stages of desiccation, the climate being too cold and dry to admit of putrefaction, but the *Laemmergeier* was never observed feeding on these, except on one occasion. This was at Drás on the 25th October, and here, after a male bird of the year (expanse 96 inches, length 42·25) had been shot on a carcase, the old birds returned to it several times, perching on large stones near at hand, even after they had been repeatedly fired at. As a rule they were not so bold; they seldom came near the camp, but commonly perched on some neighbouring rock, apparently waiting for any offal that might be left when the camp moved on. [*G. H.*]

FALCO HENDERSONI.

8 (*bis*). **Falco Hendersoni**, Hume.—The Shanghar.

(Plate I.)

A single specimen, a male, of this species, which Mr. Hume considers to be the Shanghar of Eastern falconers, was shot on the 14th September, 1870, at Kitchik Yîlâk in undulating country just north of the Sanju Pass, and 40 miles from Sanju, where the plains of Yârkand may be said to commence. There are no trees or bushes about, but the climate here is comparatively moist, and there is abundance of short grass, on the upper borders of which thousands of the Thibetan Snow-pheasant (*Tetraogallus tibetanus*) were observed. Other Falcons, apparently of this species, were noticed in the immediate neighbourhood, but it was never seen elsewhere, and only one specimen was obtained. [*G. H.*]

The best description that can be given of the general appearance of the upper surface is that it resembled that of a female Kestrel. Below the bird is almost spotless, except on the flanks. The cheek stripe is very long and narrow. The bill short, with a slight festoon and a rather blunt tooth. The tarsus and toes short, the former feathered in front for three-fifths of its length, the claws comparatively short, and singularly blunt for a Falcon. But it must be borne in mind that where this specimen was found not a trace of a tree is to be seen, and the bird must at all times perch on rocks or amongst shingle. Moreover, it is probably a very old male, and these facts may account for the bluntness of the bill-tooth and of the claws. Neither of the first primaries are fully developed, and it is impossible, therefore, to ascertain what proportion they would bear to the second. In some respects, this species reminds us of the Gyr Falcon, in others of the Saker, but in many points it differs so far from any known species that some ornithologists will doubtless consider it deserving of generic separation.

Long ago Major Delmè Radcliffe wrote to me as follows: "Have you ever got an enormous Falcon of the Saker type. 'Charkh,' an adult marked throughout like a young female Kestrel, except that the breast is pure white, save only a very few bell-shaped spots? I got one once; at

that time the Viceroy was at Delhi with a large following, and several native nobles came to the durbar. I showed this Falcon to many of them and to all their falconers, and only one, an old man from Khyrabad in Oudh, admitted having seen the like before."

There is, we think, no question, that the bird referred to belonged to the present species, and that it is a rare visitant to Northern India.

Dr. Jerdon has united my new species to *Falco milvipes* of Hodgson. Whether this will turn out to be correct I cannot say, but we have at present in India Mr. Hodgson's drawings of the last-named bird, and it seems to me to be entirely distinct. Mr. J. H. Gurney thinks that *Falco Hendersoni* may be only a stage of *F. sacer*, and I am indebted to his kindness for the following note: "The specimen called *F. Hendersoni* is, I think, the same species as that represented in Mr. Hodgson's collection of drawings in the British Museum under the title of *F. milvipes*. I believe it to be a plumage which *F. sacer* attains at a certain period, probably when about five years old. Whether it always attains it I cannot, however, say. Dr. Bree, in vol. i. of his 'Birds of Europe' (p. 32), speaks of a similar specimen then living in the Zoological Gardens, which assumed most of these transverse markings while in the gardens. Dr. Bree gives the locality of this specimen as 'Turkey,' which is an error, as it really came from Tarsus. It lived at the gardens between two and three years, and is now in the Norwich Museum; the sex was not ascertained, but it seems to be a male. It only differs from *Falco Hendersoni* in being less rufous on the head and nape and more spotted on the breast, and the tail is not quite so distinctly barred. Similar specimens obtained in Nepal by Mr. Hodgson are in the British Museum. The Norwich Museum contains two specimens, which are evidently passing from the ordinary plumage of *F. sacer* into this striated dress. These are a male from the Volga and a male from Athens, judging by the measurements."

Dimensions of Male.*—(*The length was recorded from*

* In this and all other cases in which the contrary is not expressly

the fresh bird, the other measurements are from the skin.) Length, 20 inches; wing, 14; first primary imperfect; third 0·05 shorter than second; fourth 0·8 shorter than second; fifth 1·6 shorter than second. Tail from vent, 7·5; outer tail feathers, 0·7 shorter than central ones. Tarsus, 2·15; feathered for 1·3 inch; middle toe to root of claw, 1·7; its claw, straight from root to point, 0·63. Inner toe, 1·2; its claw, 0·72: outer toe, 1·29; its claw, 0·64: hind toe, 0·87; its claw, 0·8. Bill at front, straight from edge of cere to point, 0·84; from gape, 1·36; height at front at margin of cere, 0·5; breadth of cere on culmen, 0·2.

Description. The *cere* and *feet* appear to have been bright yellow, the claws black, the bill pale blue, darker towards the tip, and faintly tinged with yellowish at the junction with the cere at the gape, and at the base of the lower mandible.

Plumage. Lores white, with a narrow dark streak running along the lower margin of the orbits; forehead rufescent white, the feathers dark shafted, and the posterior ones blending with those of the crown and occiput, which are dark brown broadly margined with bright rufous. Immediately above the eye is an indistinct narrow whitish supercilium, the feathers of which are dark-shafted. Beyond the eye this supercilium is continued as a broad, ill-defined, bright rufous band round the nape, the feathers of which are narrowly dark shafted. The feathers of the posterior halves of the sides, and also of the back of the neck, bright rufous and dark brown, the centres of the feathers being brown and the margins rufous. Upper back, scapulars, coverts, tertiaries, and secondaries, brown, dark on the interscapulary region and lesser coverts, paler and greyer elsewhere, and all broadly barred with bright rufous; lower back and rump ashy, with broad bars of pale rufous; upper tail-coverts similar but browner, and the pale rufous more or less replaced by fulvous white. Tail-feathers ashy brown, tipped whitish or rufous, and with ten or eleven

mentioned, all measurements are from the fresh bird, made by Dr. Henderson, myself, or some of my correspondents, and all descriptions are from Indian and Yārkand killed specimens, either procured by Dr. Henderson or contained in my museum.

broad regular transverse bars of dull rufous; cheeks dull rufescent white; ear-coverts mingled rufous and dark brown. A rather long, very narrow, dark brown cheek stripe, from the gape, running down either side of the throat: chin, throat, breast, abdomen, vent, and lower tail-coverts white, faintly tinged with rufous cream colour on the breast and abdomen, with dark brown points to a few of the feathers of the sides of the breast, and with a few brown drop-like spots on the abdomen and lower tail-coverts. Sides and flanks rufescent white, with broad dark brown transverse bars. Primaries, brown on the outer webs and at the tips; the first quill narrowly margined on its outer web with bright rufous, and the rest with imperfect bars of the same colour on their basal halves. The inner webs above the tips are white, becoming rufescent towards the shafts, from which numerous imperfect tooth-like brown bars project over somewhat less than half the breadth of the web. The first quill is strongly notched on its inner web about 2¼ inches from the tip; the second and third are similarly but much less perceptibly notched. The second quill is perceptibly emarginate on the outer web. [*A. O. H.*]

13. **Hypotriorchis subbuteo** (Linn.).

The Hobby was not at all uncommon about Yangi Bázár, eight miles from Yārkand; it was always seen hunting over long grass or fields. Two quite young birds were obtained about ten miles from Yārkand, and had probably been hatched and reared in the immediate neighbourhood. [*G. H.*]

Curiously enough it was never noticed by the expedition in any other locality. I believe the fact to be that this species breeds beyond the Himalayas, and only visits these in the autumn and winter, descending occasionally during the latter season to the plains. [*A. O. H.*]

17. **Tinnunculus alaudarius** (Gray).

The Kestrel was very common in Yārkand, and specimens were obtained in June at Kargil, in Ladák. The Tartar name for the Kestrel is *Turumtoi*, very similar to the

Northern Indian name (*Turumtee*) for *Chiquera typus*, Bp. [*G. H.*]

Both Yārkand and Ladák birds are of the common European type—comparatively pale, full-sized birds, very different from the small, deep-tinted race, which is a permanent resident in the Neilgheries and the Himalayas south of the Snowy Range. Strange to say, this race rarely visits the plains; it seems to remain for the most part nearly all the year round in the localities in which it breeds, while the innumerable Kestrels of the European type that hover over our plains during the cold season seem to come from beyond the Snowy Range. In June or July you meet with comparatively few Kestrels in the hills south of the high snowy ranges, and what are met with are all breeding, and belong to the deep-tinted race. In October these very hills abound with Kestrels, the great majority being of the European type; and then again by the end of November these have almost entirely disappeared, having passed down to the plains. [*A. O. H.*]

42. **Haliaetus leucoryphus** (Pallas).—Pallas' Sea Eagle.

Several specimens of this species were noticed between Yārkand and Kargallik. It was always in the neighbourhood of water, and usually perched on the tops of earthy cliffs overlooking some stream. [*G. H.*]

No specimen of this species was preserved, but there is no doubt of its identity. It has already been observed in the Crimea and other parts of the Black Sea, and is said to be common in the neighbourhood of the Caspian Sea. [*A. O. H.*]

46. **Buteo aquilinus** (Hodgson).—The Upland Buzzard.

A specimen which must belong to this supposed species was shot on the 17th November at Dharmsál, near Saidābād, on the road from Kashmir to the Plains. It was a female. In plumage it precisely resembles one of the stages of *Buteo ferox*, and in its general dimensions (length, 25·5; tail, 10·5; expanse, 62·25) it agrees perfectly with that species; but while the tarsus is 3·4 in length, it is feathered in front for 2·2, and the bare portions of the tarsus and the foot are entirely covered with comparatively

small reticulate scutæ. There are absolutely no traces of transverse scutæ.

This, then, it would appear, is unquestionably a specimen of Hodgson's and Blyth's species, and exhibits the very characteristics on which they rely; but when we compare this specimen with a large series of *B. ferox* it seems very doubtful whether either of these supposed characteristic points are of specific value. We find that the distance to which the tarsus is feathered in *B. ferox* varies very greatly in different individuals, and although we possess at present no single example of this latter species in which the tarsus is feathered *quite* so far down as in this specimen, we find several in which the extent of feathering falls but *very* slightly short of that of the present bird.

As regards scutellation of the tarsus and foot, we find that it varies from broad perfect transverse scutæ covering the whole front of the tarsus, to perfectly reticulate scales, in which no trace of a single transverse scuta is observable, and every intermediate form is observable.

Mr. Gurney, who has examined this example, and in company with Mr. G. R. Gray has compared it with Hodgson's specimen of *Buteo leucocephalus* = *aquilinus* in the British Museum (referred to by Dr. Jerdon in the *Ibis*, 1871, p. 339), finds them identical, except that the plumage of the specimen in the British Museum is slightly more fuliginous than that of the present bird. [*A. O. H.*]

56. **Milvus govinda** (Sykes).

This species does not occur between Ladák and Shahidulla. Here one was seen, and further on it was occasionally met with. [*G. H.*]

82. **Hirundo rustica** (Linn)..

Was found in great abundance in Kashmir in June, where it was breeding, and in the plains of Yārkand it was common all the way from Sanju to the city. At Oi Tograk, in August, they were collecting in flocks and perching in vast numbers on the mulberry-trees, probably preparatory to migrating, because on the return of

the Expedition to the same locality in September not one was to be seen.

The Yārkandis, who call the bird *Kaldergoch*, said that it disappeared entirely in the cold season. [*G. H.*]

91. **Cotyle rupestris** (Scop).

The Crag Martin was often seen; it was not uncommon near Sanju, was met with both going and returning on the banks of the Indus near Lé, and was numerous about Drás. [*G. H.*]

In all these localities, as well as on many of the higher hills south of the snowy range, it seems to a great extent to be a permanent resident, not at any rate migrating *en masse* from the country, but, as a rule, only retreating lower down the valleys in the cold weather; some few, however, during the latter season being met with in the higher hills of Central India and Rajpootana. On the Neilgherries there appears to be a permanently resident colony. [*A. O. H.*]

125. **Coracias garrula** (Linn.).

The European Roller, so common in Kashmir, especially in the valleys and along the courses of the rivers, appears to be a rare bird in Yārkand, where, however, it probably breeds, as a young bird was there obtained. The Turki name is *Ko Karga*. [*G. H.*]

129. **Halcyon smyrnensis** (Linn.).

The specimens of this species brought back by the Expedition were obtained at the foot of the hills on the road from Kashmir to the Plains of the Panjáb. This species nowhere, we believe, extends into the Himalayas, and it was never noticed in Kashmir by Dr. Henderson. [*A. O. H.*]

About Púnch, the only place at which I met with this Kingfisher, it was common; it was not always near water, and was generally perched on a solitary tree. When flying it has a very harsh cry, something like that of a Woodpecker. One I shot measured—length, 11·5; tail from vent, 3·62; expanse, 17; wings when closed reached to within 2·25 of end of tail. Irides brown. [*G. H.*]

134. **Alcedo bengalensis** (Gm.).

Our common Indian Kingfisher was excessively plentiful in Kashmir, where it goes by the names of *Tint Konu* and *Tuntu*, but was never observed after crossing the Zoji-lá Pass. [*G. H.*]

Of the numerous specimens procured in Kashmir two are young males. We do not think that the peculiar coloration of the under parts and shortness of the bills of the young in this species has been noticed. Dr. Jerdon says, "In young birds a bluish-green tinge is the prevailing tint; in adults, a pure blue." This is true to a certain extent, but this difference is not very marked, nor absolutely constant, as we have quite young birds almost as blue as any adult, and a breeding female caught on her eggs with as green a tinge as any young one.

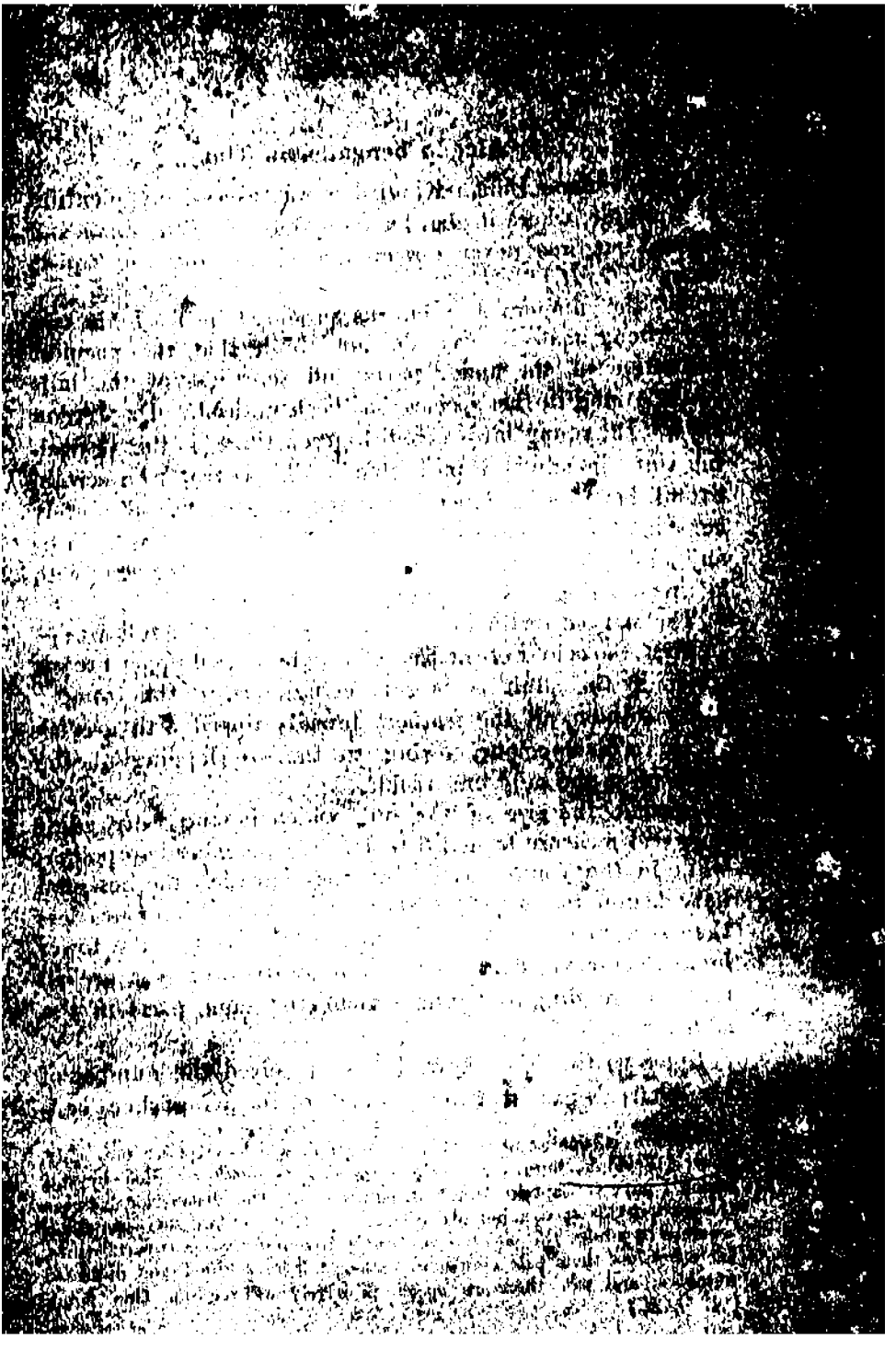
The marked distinctions between young and adult are:—

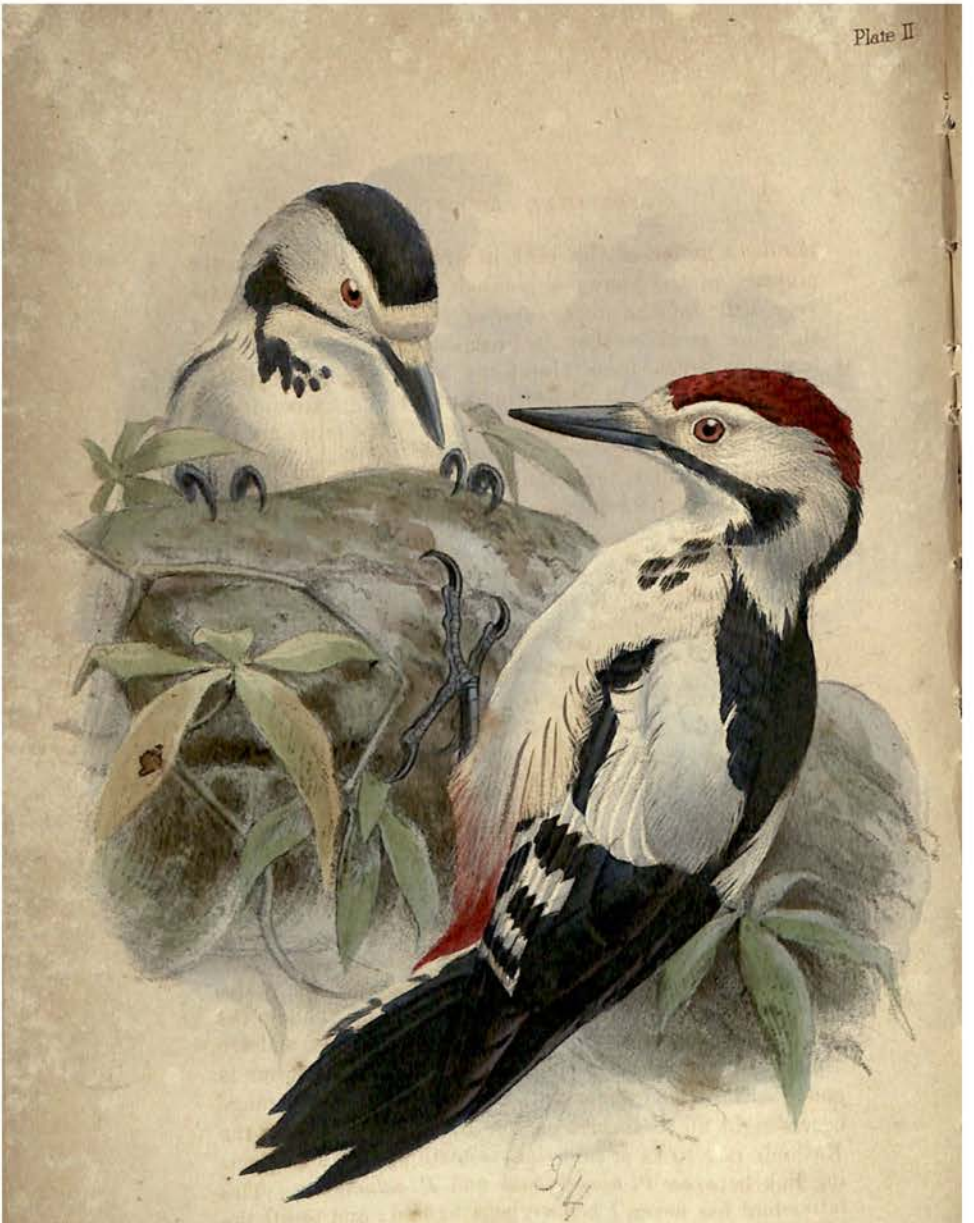
First, the colour of the base of the throat and upper breast, which in the adult is *bright* ferruginous, in the young a dusky salmon, all the feathers broadly tipped with greyish green, which colour, owing to the overlapping of the feathers, is the only one visible.

Second, the size of the bill, which in the fully adult male will measure from 1·6 to 1·7 (from forehead to point); while in the young, even after they have left the nest and have begun to forage for themselves, it will measure less than one inch. I may add that in the young the lower breast, abdomen, flanks, lower tail-coverts, and feet are all much more dingily coloured than the same parts in the adult.

Since writing the above I have received the number of Mr. Sharpe's excellent monograph* of the Kingfishers con-

* There is one point in this monograph which surprises me. Mr. Sharpe, I think, figures a specimen of *Ceryle guttata*, killed by me, which I gave to Captain Marshall, pointing out the distinction between the sexes in this species, but Mr. Sharpe says that the two sexes are alike; whereas in adults the one has invariably the under-wing coverts white, the other has them pale cinnamon colour. I have killed and dissected numbers, and can therefore speak positively as regards this point. [*A. O. H.*]





PICUS SCINDIANUS.

taining a notice of this bird, in which the difference in the plumage of the young is pointed out. I see that he says very little of the nidification of this species, and I may therefore mention that it breeds both in Northern and Southern India from March to May, in holes in banks, often not above 18 inches in depth, laying, according to my experience, from four to six eggs. The latter are pure white, excessively glossy, and nearly spherical; they are decidedly smaller than those of *A. ispida*, and measure from 0·75 to 0·82 in length, and from 0·65 to 0·71 in breadth. They closely resemble in size and shape the eggs of *Merops viridis*, but they are more glossy even than these, and this is pretty apparent when large series of each are placed in juxtaposition. [*A. O. H.*]

136. **Ceryle rudis** (Linn.).

The Pied Kingfisher was met with not uncommonly along the Jhelum in Kashmir. [*G. H.*]

It does not extend into Ladák, nor has it ever been found in the hills at any considerable elevation. [*A. O. H.*]

154. **Picus himalayanus** (Jard. and Selb.).

This Woodpecker is very common in Kashmir, but, as might be expected, does not cross the Zoji-lá Pass. [*G. H.*]

The Kashmir specimens of this species almost invariably have the under surface much paler than in the typical *P. himalayanus* of the more eastern portions of its native hills. In one specimen, procured in the Sind Valley, the under parts resemble those of *P. major* of Europe, and are almost as white as those of *P. scindianus*. This latter is common in Bháwalpur, and throughout the salt range occurs right up to Torbela on the Indus, and certainly the Kashmir race looks at first sight something like a connecting link between *P. himalayanus* and *P. scindianus*. This latter bird has never, I believe, been figured; and ornithologists will, I hope, welcome a careful portrait (Pl. II.) of this pretty species. I give the following note of a fine female *P. himalayanus*. Length, 9; tail from vent, 3·5; expanse,

15·5 ; wings when closed reach to within 1·5 of end of tail. Legs and feet nearly black; bill bluish; irides brown. [*A. O. H.*]

199. **Cuculus canorus** (Linn.).

The common Cuckoo was met with on the upward journey in May and June, along the whole road from Jamu up to the Banihál Pass, and thence, *vid* Srínagar and the Sind Valley, to the Zoji-lá Pass, where the last specimen was seen, chanting its "note of dread to husbands' ears" from a budding birch-tree, close to the snow, and at an elevation of some 11,000 feet. Beyond this it was neither seen nor heard, either in Ladák or Yárkand, and by the time the Expedition reached Kashmir on its return the Cuckoo had departed for the plains of India. [*G. H.*]

243 (*bis*). **Certhia familiaris*** (Linn.).

The Expedition met with this species in Kashmir, but nowhere else; neither Ladák nor Yárkand, nor the intervening mountain deserts, are favourable to the existence of tree-haunting species. [*G. H.*]

Adams says that *C. himalayana* is common in Kashmir;

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* *Certhia familiaris*, Linn.

Dimensions.—*Male*. Length, 5·4; expanse, 8; wing, 2·6; bill, along curve, 0·6; tail, 2·5; tarsus, 0·6.

Description.—Bill blackish-brown, yellowish-white at base of lower mandible; legs and feet fleshy-brown; claws yellowish, horny.

Plumage.—Crown darkish brown, with broad central fulvous or brownish-white streaks; nape, back, and scapulars paler brown, the feathers still more broadly centred with dull yellowish-white; the rump pale ferruginous. The quills hair-brown, paler on the inner webs, most of them tipped whitish, and all but the exterior two or three quills with a broad band of pale dingy ferruginous, and most of the quills with a yellowish tinge on the outer webs towards the tip. The lesser coverts are mingled light and dark brown and fulvous white; the secondary coverts are brown, tipped with dull white on the outer web; the primary coverts deep brown, with a similar but smaller spot at the tip. The tail is a pale yellowish-brown, duller and less yellow on the inner webs. A conspicuous white eye streak runs from near the nostril over the eye and ear-covert. The whole of the lower parts are silky, but not very pure white, slightly greyish on the sides and towards the vent.

Female similar, but somewhat smaller, and slightly paler on the upper surface. [*A. O. H.*]

but according to my experience, derived from the examination of a great number of collections made there, I should say that it was rare, and that its place was almost entirely usurped by the European Creeper.

Of a specimen which I take to be a female, shot in the Sind Valley, the following note was made at the time: "Length, 5·12; tail from vent, 2·5; expanse, 7·5; wing, 2·4; wings when closed reach to within 12·25 of end of tail. Legs, feet, and bill fleshy, the latter dusky on upper mandible. Irides brown." [*A. O. H.*]

247. **Tichodroma muraria** (Linn.).

This species was almost daily noticed from near Bimbar, right through Kashmir and Ladák to beyond Lé, but it never occurred after leaving the Pángong Lake. On the return journey the *bird* had commenced finding its way down to those portions of the plains which lie near the foot of the hills, and on the day of my return I killed a specimen at Lahore.

I give the following dimensions of the male killed at Lahore. Length, 6·5; tail from vent, 2·12; expanse, 11·5; wings when closed reach to within 0·25 of end of tail. [*G. H.*]

During the cold weather solitary stragglers are occasionally killed even in the Central Provinces. [*A. O. H.*]

249. **Sitta leucopsis** (Gould).

The White-cheeked Nuthatch was only met with by the Expedition in the Upper Sind Valley, Kashmir. Here it was not uncommon, but it affected so persistently the tops of the loftiest trees that very few specimens were obtained. The measurements of a male are: Length, 5; tail from vent, 1·75; expanse, 8·5; wings when closed reach to within 0·38 of end of tail. Bill black, blue beneath. Irides brown. [*G. H.*]

This species is very common in *suitable* localities (viz., pine forests at an elevation of about 9000 feet) everywhere in the Himalayas south of the snowy range, from Nagkanda behind Simla, to the Peshâwar sanatorium Thundiani, in

Huzara. In Kashmir it is found at times at a much lower level, but Kashmir is *north* of the first snowy range. [*A.O.H.*]

254. **Upupa epops** (Linn.).

The Hoopoe was seen almost daily the whole way from Lahore to Yārkand city. In the barest deserts, where the Ravens that travelled with the camp were almost the only living things to be seen, the Hoopoe would occasionally be met with; and again on the highest passes it was noticed, apparently entirely at its ease. It was met with at Lak Zung, overlooking the Lingzi Thang, and in a former journey I saw it at the very top of the Tugulung Pass, (16,000 feet). [*G. H.*]

Specimens from Kashmir, Ladák, and Yārkand are perfectly identical; all belong to the typical *U. epops*, as distinguished from *U. nigripennis* or *U. ceylonensis*, by the white subterminal crest band, paler upper surface, and somewhat larger size. [*A. O. H.*]

257. **Lanius erythronotus** (Vigors).

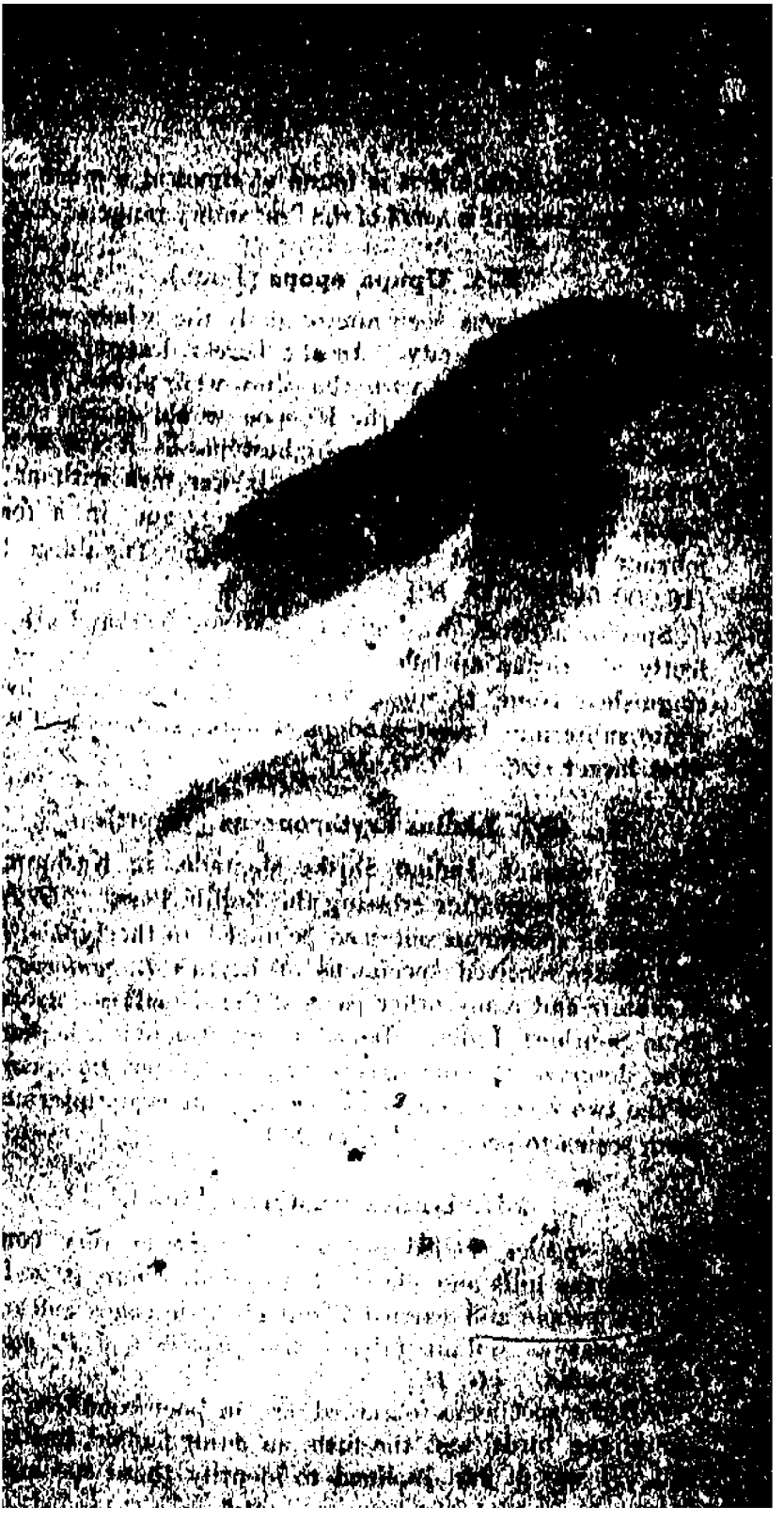
This common Indian Shrike abounded in Kashmir, but was not noticed after crossing the Zoji-lá Pass. [*G. H.*]

All the specimens obtained belonged to the typical form, but I have received specimens of Blyth's *L. caniceps* from Kashmir and many other parts of the Himalayas, as well as from Southern India. It is very questionable whether this race deserves specific separation; characteristic specimens of the two races appear very distinct, but every intermediate form seems to occur. [*A. O. H.*]

261. **Lanius cristatus** (Linn.).

This species, called in Turki *Urulia*, is very common in both the hills and plains of Yārkand, where it is tamed by the people and carried about in little cages and on the hand, just as Bulbuls (*Pycnonotus pygæus* and *P. pusillus*) are in India. [*G. H.*]

All the specimens obtained are in poor condition; four are young birds, and the fifth, an adult female, has lost its bill. I was at first inclined to identify these specimens as



LANIUS ARENARIUS.

the true *L. phœnicurus* (Pallas), corresponding as they do with his brief description (except in having the rump and tail coverts dull instead of intense rufous), and differing as they do from the ordinary type of *L. cristatus* obtained in the cold weather in the plains of India, in the almost entire absence of the superciliary stripe, and in the somewhat greyer tint of the upper surface. After comparison, however, with a large series of *L. cristatus* I found that this species is very variable in these respects, and that no valid grounds existed for separating these specimens as distinct from *L. cristatus*. Structurally they *are* identical. I should not be at all *surprised* if Pallas' *L. phœnicurus* was founded on a male *L. cristatus* in breeding plumage. We now know the latter goes as far north as Yārkand to breed, and probably extends its migrations much further.

This species was never met with by the Expedition out of Yārkand—it is one of those birds that migrate north-west and south-east, and not north and south. I have never met with it in the N.W. Provinces or the Panjáb west of the Ganges, except in the interior of the Himalayas or in the Terai or Dhoons at their feet, on its upward or downward journey. It may be that dry plains are unsuitable to it and moisture and luxuriant vegetation a necessity, in the cold weather at any rate. Certain it is that throughout the dry bare country of Upper India *L. cristatus* is unknown, and is replaced by the next species. [*A. O. H.*]

262. **Lanius arenarius** (Blyth). (Pl. III.)

The Desert Shrike was only observed by the Expedition on its return journey, in the plains of the Panjáb between Kashmir and Lahore. [*G. H.*]

Where this species breeds is as yet unknown; it is never met with in Kashmir, and probably resorts for its honey-moon to Afghanistan and Persia—there is really no accounting for tastes! Alike in colour and in the regions which it affects during the cold season is this desert bird. It is a very distinct species, and we take this opportunity of figuring it, as we believe, for the first time. [*A. O. H.*]

273. **Pericrocotus brevirostris** (Vigors).

This beautiful little bird, so common throughout the plains of Upper India during the cold season, was met with throughout Kashmir, from Jamu to the foot of the Zoji-lá Pass, in May and June. [*G. H.*]

This species breeds in Kashmir and in the valleys of Bías in Kulu, and the Sutlej above Kotegurh. [*A. O. H.*]

288. **Tchitrea paradisi** (Linn.).

The Paradise Flycatcher was very abundant in Kashmir in May and June wherever there were large shady trees. It was seen at Vernág, and was very plentiful about Srínagar and the Sind Valley as far as Gond. It was never seen after leaving Kashmir. Two nests were found, both in the forks of trees—one on an apple-tree, the other on a mulberry tree—and high up on small branches. There was a single egg in one nest and in the other four. The nests were made of very fine hair-like strips of mulberry bark, with grass, moss, and cobwebs outside. [*G. H.*]

Most of the specimens obtained, both males and females, are in the chestnut plumage, or changing from the chestnut to the white; one male—with largely developed testes, obviously breeding—has the primaries and secondaries white and black, the tertiaries and the whole of the body and tail, except one of the central feathers, chestnut; one of the long tail-feathers is pure white just dabbed over with chestnut on its outer web towards the point. It is quite clear that the change of plumage is effected not by a moult, but by a gradual development of colour in the white feather. The object of the change is apparently to render the birds less conspicuous during the breeding season. [*A. O. H.*]

I have already fully described the nest and eggs of this species in the *Ibis* (cf. Birds Nesting in Bareilly in the Rains.) [*A. O. H.*]

298. **Hemichelidon fuliginosa** (Hodgson). (Pl. IV.)

Specimens of this curious Flycatcher were obtained at Srinagar. [*G. H.*]

HEMICHELIDON FULIGINOSA.

ALSEONAX LATIROSTRIS.

Although very common throughout the lower Himalayas south of the first snowy range from Darjeling to Murree, this species does not appear to have been ever figured as yet. Nay, more, a doubt seems to exist as to which bird is *Hemichelidon fuliginosa* and which *Alseonax terricolor* (Hodgs.).* To the kindness and great liberality of Mr. Hodgson, I am indebted for the loan of his most valuable drawings and notes on this and several hundred other species, and I now hope before long to be able to set at rest all doubts as to the identity of numerous species first described by Mr. Hodgson, but which, like all the *Horeites* and *Horornis* groups, must be figured before we can be certain of them, and in regard to which I may safely say that no one living—except, perhaps, Messrs. Blyth, Gray, and Hodgson—have any certain knowledge as to which species ought to bear which specific name. I also give a figure of the southern species (Pl. V.),

Hemichelidon fuliginosa.

Alseonax latirostris.

supposed to be identical with *A. latirostris* (Raffles). [*A. O. H.*]

299 (*bis*). **Butalis grisola** (Linn.).†

Of the spotted grey Flycatcher, or Cherry Chopper, a single specimen was obtained on the 22nd of September, in an

* Mr. Sharpe has compared the specimen sent home by me, and figured in the adjoining plate, with several of Hodgson's typical specimens in the British Museum, and pronounces them identical. He thinks my bird is not quite adult.

† *Butalis grisola* (Linn.).

Dimensions (the females are slightly the smallest).—Length, 6 to 6·3; expanse, 10 to 10·5; wing, 3·25 to 3·45; tail from vent, 2·75 to 3; tarsus, 0·6.

Description.—Bill black, dark fleshy at base of lower mandible; legs and feet blackish-brown; iris deep brown; interior of mouth orange.

Plumage.—The lores and feathers immediately above the nostrils

absolute desert some 14,000 feet above the sea level, at the foot of the Suket Pass, Ladák, a few miles south of what may be considered the boundary of Yárkand. The thermometer stood at 23° Fahrenheit when the bird was shot. The sex of the specimen obtained was not recorded; the only notes made at the time were as follows: Length, 6·25; the tail from vent, 3; the expanse, 10·5. The legs and feet dark ashy, bill blackish, fleshy at base of lower mandible. Iris dark brown. [*G. H.*]

The plumage of this specimen is a shade paler than that of European and Indian specimens of the same species with which we compared it; in other respects the birds were absolutely identical. I may mention here that since procuring the specimen, which I sent for comparison to Mons. Jules Verreaux, a notice of which has appeared in the *Ibis*, I have received several other specimens from the Sambhur Lake and other parts of Western Rajpootana, proving that the European Flycatcher is a regular winter visitant to Western Continental India. [*A. O. H.*]

301. **Eumyias melanops** (Vigors).

Of this very common Flycatcher only a single specimen was observed, and that in Kashmir. [*G. H.*]

The bird is by no means so plentiful in this latter province as in other low Himalayan Valleys, and beyond the Zoji-lá the route lay through country little suited to Flycatchers. [*A. O. H.*]

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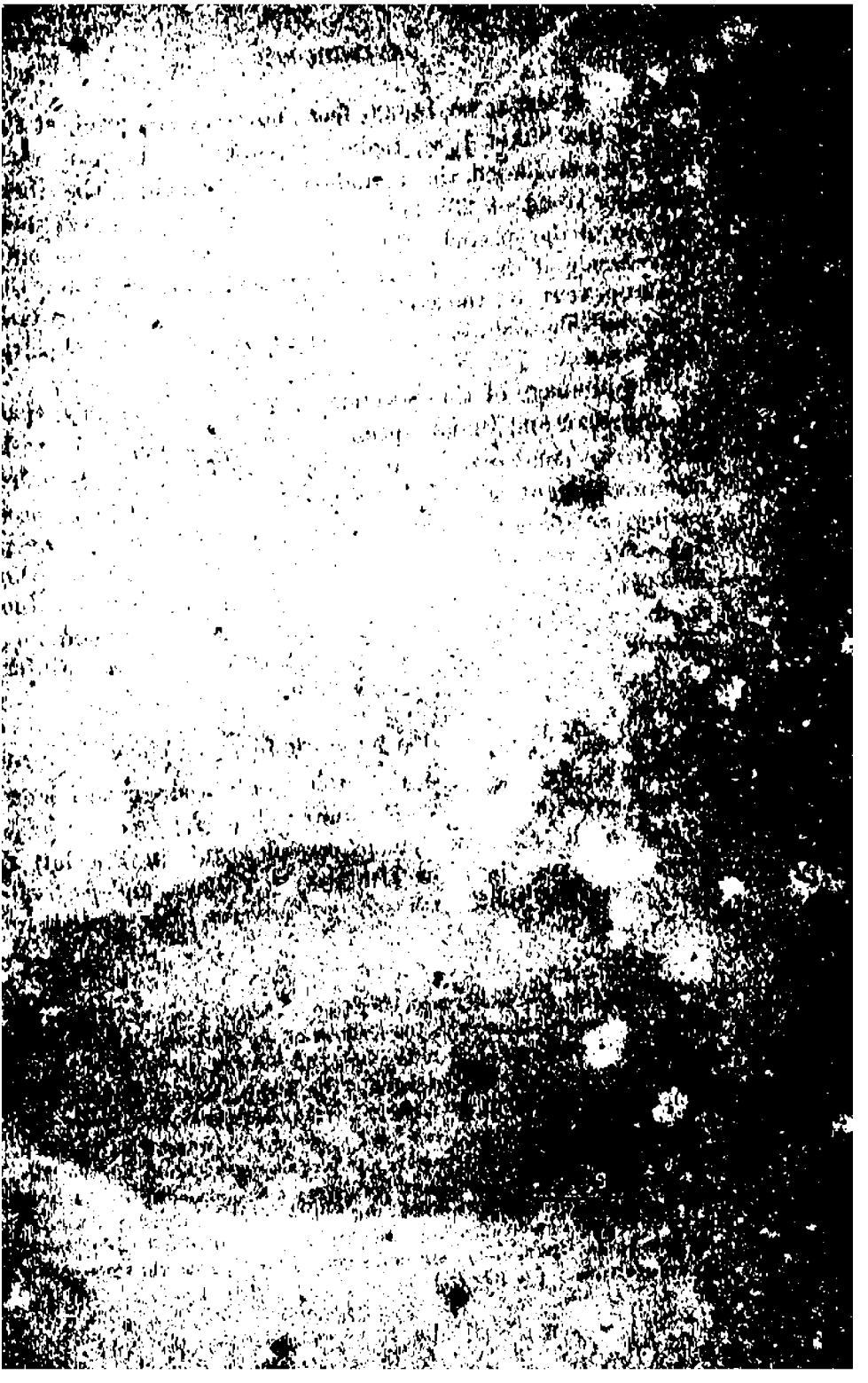
dingy fulvous white; head, nape, cheeks, ear-coverts, back, and scapulars, pale earthy or greyish-brown; the feathers of the head with darker brown central streaks not extending to the tips, and those of the forehead tinged with the fulvous colour of the lores. The rump in some uniform with the back, in others slightly darker. Wings and tail brown, paler and greyer on the tertials and laterals, all the feathers margined with brownish white, the greater secondary coverts and tertials most broadly so, the tail-feathers, except the exterior lateral ones, very inconspicuously so. Lower parts white, tinged with fawn colour towards the vent, and with narrow inconspicuous grey-brown streaks on the breast. Axillaries and wing lining very pale rufous fawn, sides and flanks tinged faintly with the same colour and dull fulvous. [*A. O. H.*]



HODGSONIUS PHŒNICUROIDES.

333. **Troglodytes nipalensis** (Hodgson).

The Himalayan Wren appears to be rare in the valleys of Kashmir. Only a single specimen was seen (and obtained), and this in the Sind Valley in October. It was never met with—as, indeed, might have been expected—beyond the Zoji-lá. The length of a male shot in the Sind Valley, as noted at the time, was 3·75, its expanse 6, the distance by which the close wings fell short of the end of the tail 0·62. Legs, feet, and bill, dark brown. [*G. H.*]

341. **Hodgsonius phœnicuroides** (Hodgson). (Pl. VI.)

A single specimen of this remarkable, and, as we believe, hitherto unfigured species, was obtained in Kashmir at the head of the Sind Valley. It frequents the banks of streams, and is entirely insectivorous. [*G. H.*]

In its affinities it is very Ruticilline, and we question much the propriety of the position assigned to it by Dr. Jerdon. The latter author only knew of it from Sikhim, and it is not very uncommon in the neighbourhood of Darjeling; but I have obtained it from the valley of the Sutlej, near the Wangtu bridge, and, besides the present specimen, have seen others from Kashmir, collected by the Marquis of Huntly and Col. Maister, R.A. [*A. O. H.*]

343. **Myiophonus Temmincki** (Vigors).

The Yellow-billed Whistling Thrush, so common throughout the lower Himalayas south of the snowy range, was met with abundantly from the foot of the Hills leading into Kashmir right up to the foot of the Zoji-lá Pass. Wherever there is running water below 6000 and above 2000 feet, there this jocund songster is to be heard morning and evening, or seen perched upon some torrent-girdled stone or stream-overhanging rock. The following measurements of a female were recorded in the flesh. Length, 13·5; tail from vent, 5·5; expanse, 22; foot, greatest length, 2·5; wings, when closed, reach to within 2·75 of end of tail. [*G. H.*]

Except amongst the Bhuteas and Lepchas, whose names no one can be expected to know properly, the Hill people usually call this bird *Kastoora*, but at a little distance it looks perfectly black, and the Kashmiris call it *Kao Koolin*, which, for the benefit of etymologists, I venture to suggest, can only signify "The Crow of illustrious descent." [*A. O. H.*]

347. **Hydrobata asiatica** (Swainson).

The Indian Dipper was noticed to be very common on the return journey all the way from Kargil in Ladák to Púnch at the foot of the Hills, leading from the plains of the Panjáb into Kashmir by the Haji Pīr Pass. Curiously enough, none were noticed on the upward route, but the bird in May and June is usually much higher up than in the autumn and winter. It is generally seen in pairs flying rapidly along the stream close to the water, every now and then halting on some stone, and plunging into clear pools behind rocks in the very centre of the rapids. It is often difficult to obtain specimens, as the birds always fall into the water and can rarely be retrieved. [*G. H.*]

This species breeds at very different times, according apparently to the elevation of the locality it happens to frequent. Captain Hutton found a nest in a hole in a rock over which a rapid stream fell curtain-like, hiding it from view, containing one egg, on the 12th of January, and on the 18th the nest contained three eggs. This was at Rajpoor, below Massuri, at the foot of the Himalayas, at perhaps 2000 feet elevation. Captain Cock took two nests on the 12th and 20th of March, near Dharmsál, at an elevation of about 4000 feet. I took a nest in an affluent of the Sutlej above Kotgurh, early in May, at an elevation of about 5500 feet. The nests that I have seen were huge globular masses of interwoven moss, nearly a foot in diameter and fully 8 inches high, something like a gigantic wren's nest, with a neatly worked circular aperture on one side and an internal cavity, about 4·5 in diameter and 3 high, lined with dry leaves and fern and fine moss-roots. I have never known more than five eggs in a nest.

The eggs are oval, much pointed towards the small end, pure white, slightly glossy, and of moderately fine texture. They remind one more of the eggs of Woodpeckers than of the true Thrushes, but the shells are more substantial and less translucent than those of the former. They vary from 0·9 to 1·1 in length, and from 0·65 to 0·74 in breadth. [*A. O. H.*]

348. **Hydrobata cashmiriensis** (Gould).

Several specimens of the white-breasted Himalayan Dipper were procured and numbers seen, not in Kashmir, but in Eastern Ladák, in the stream which runs from Chágra into the Pángong Lake. It appears to be a permanent resident here, as it was noticed and shot in this locality both coming and going. A nestling obtained on the 14th of July could not long have left the nest, and old birds were seen on this stream on the 8th of October, at an elevation of 15,000 feet, when, except quite at the centre, it was a mass of solid ice. The following note is on the ticket of one specimen, an adult, sex unrecorded: Length, 7·5; tail from vent, 2·5; expanse, 12; foot—greatest length, 1·75; greatest width, 1·37. Legs and feet, dark brown; bill, black. [*G. H.*]

Cashmiriensis is not a peculiarly happy name; besides Ladák, it occurs in the hill regions of Sikhim, and Chinese Tartary immediately north of Darjeling, whence I have specimens obtained by Captain Elwes and L. Mandelli, Esq. [*A. O. H.*]

349. **Hydrobata sordida** (Gould).

A single specimen, quite adult, of this rare Ouzel was obtained at Kargil, in Ladák, on the 23rd of October. On the ticket of this specimen, of which the sex was not noted, is recorded, the length, 7·5; tail from vent, 2·25; expanse, 12. Unfortunately I did not at the time discriminate between this species and *H. asiatica*, and it is therefore impossible

to say whether other specimens were or were not seen elsewhere and mistaken for this latter bird. [*G. H.*]

This is, I believe, a very rare bird, as this is the only specimen I have ever seen. I am by no means clear about this species. Gould gives the bill as very small, whereas in this specimen it is very large, much more like the bill of *H. pallasi* as figured by Gould himself and in the "Fauna Japonica." The bird is clearly distinct from both the preceding species, but I confess it appears to me more like *H. pallasi* than Gould's figure of *H. sordida*. The type specimen of this latter should be re-examined. In our bird the bill is 0·7 at front; tarsus, 1·2; wing, 4. [*A. O. H.*]

351. **Petrocossyphus cyanus** (Linn.).

The Blue Rock Thrush was only met with in Ladák, and there only in the upward journey in June and July. Solitary individuals were seen throughout Ladák west of Lé, at Shergol and other places, near streams and hopping about amongst rocks; but in Dr. Cayley's garden at Lé they were in considerable numbers, feeding on caterpillars on the poplar-trees and hopping about on the grass. None were met with on the return journey; they had then doubtless migrated lower down. [*G. H.*]

Most probably they breed in Ladák. I have hitherto failed to find their eggs, both in the plains of India, which they desert as soon as the hot season sets in, and in the lower ranges of the Himalayas south of the first snowy ranges. It is curious that I obtained a specimen of this bird in May at Mount Abu. Can it breed there? [*A. O. H.*]

351 (*bis*). **Monticola saxatilis** (Linn.).

A young male of this species was obtained at Shahidulla, in Hill Yârkand, on the 21st September. It was a bird of the year. The following dimensions are on the ticket: Length, 7·5; expanse, 14; tail from vent, 2·75; wing, 4·5; foot, greatest length, 1·5; greatest width, 1·25; wings when closed reached to within 1·5 of end of tail. Bill at front, 0·7. [*G. H.*]

I have seen other specimens from the Sutlej Valley, near Chini, an adult and a young bird in much the same plumage as Dr. Henderson's specimen. I subjoin* descriptions both of this young bird and of the adult. [*A. O. H.*]

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* *Monticola saxatilis.*

Dimensions (the males are slightly the largest).—Length, 7·5 to 8·1; expanse, 14 to 15·3; wing, 4·5 to 4·8; bill at front, 0·7 to 0·83; tail from vent, 2·75 to 3; tarsus, 1·2 to 1·3. The third quill is the longest, and exceeds the first, which is very small (whereas in *P. cyanus* it is of moderate size), by 2·9 to 3, the second by 0·1, and the fourth by 0·25.

Description.—*Male.* The whole head and neck all round dull, somewhat greyish-blue; upper part of the back bluish-black; scapulars and the rest of the back somewhat brownish-black, mottled towards the centre with white; rump pure white. Upper tail-coverts, those nearest the rump mingled dingy blue and rufous, those adjoining the tail-feathers bright rufous; central tail-feathers brown; lateral tail-feathers bright ferruginous. Wings dark, almost blackish brown, the coverts darkest, and many of them tipped with greyish or fulvous white. Breast, abdomen, lower tail-coverts, axillaries, and most of the wing-lining (which latter, however, is paler) bright ferruginous red.

Female. Upper parts dull brown, more or less tinged ashy, and about the head and rump more or less spotted with a darker brown. The back sometimes exhibits white spots similar to those in the male, and the rump has often a yellowish tinge. The upper tail-coverts are bright rufous, the tail is similar to that of the male, but duller coloured, and with the central feathers somewhat tinged with rufous. The throat and sides of the neck are yellowish-white or sometimes pure white, more or less spotted with earthy or ashy brown. The chest and abdomen are light rufous or reddish-white, with narrow wavy transverse brown and whitish bars. The wings are much as in the male, but the coverts are perhaps more extensively tipped with dull white.

The *young* vary a good deal, according to stage of plumage; one before me has the lores fulvous white and the feathers of the eyelids of the same colour; the whole of the head, nape, back, and scapulars a dull earthy or somewhat ashy brown, each feather more or less broadly tipped with fulvous or pale rufous white, and most of them with a darker brown spot or line just inside this tipping; the rump is pale brownish yellow, each feather with a narrow irregular transverse brown bar near the tip; upper tail-coverts ferruginous, with traces of brown spots near the tips. Tail as in the adult, but duller coloured. Wings as in the adult, but all the quills broadly tipped with brownish white and the primaries narrowly, and most of the coverts and the tertiaries broadly, margined with the same colour. Chin, throat, and sides of the neck pure white everywhere, except down the centre of the chin, and the throat speckled with ashy brown. Breast and abdomen more or less pale buffy, the feathers inconspicuously tipped white, and with a narrow transverse wavy dark-brown

356. **Geocichla unicolor** (Tickell).

The Dusky Ground-Thrush was very common in Kashmir, but was not observed beyond the Zoji-lá Pass. [*G. H.*]

365. **Planesticus atrogularis** (Temm.).

This species, not observed on the upward journey, was very plentiful on the return march in October from Chágra, (altitude 15,000 feet) above the Pángong Lake, throughout Ladák and Kashmir, and by November it was widely spread over the plains of the Panjáb. I recorded the dimensions of several, the females being somewhat smaller than the males. Length, 9.75 to 10; tail from vent, 4; expanse, 14·75 to 16·75; wings when closed reached to within from 1·5 to 1·75 of end of tail; the legs and feet varied from dark ashy to brown; and the bill, which is yellow at the gape and base of lower mandible, from blackish ashy to brown. [*G. H.*]

This species, so far as we yet know, breeds further north than Kashmir or Ladák, but it does not appear to have been met with in Siberia by Middendorf, Schrenk, Radde, &c. One might have expected it to breed in Yárkand, but no specimen was there obtained. Is the full breeding

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line towards the tip. Lower tail-coverts and axillaries, as well as wing lining, pale ferruginous buff.

Degland describes a young bird just taken from the nest thus: "Above, ashy brown; feathers of the head, nape, and back—ashy, rufous at the centre, brown towards the tips. Front of the neck and breast like the back, but with larger spots. Abdomen rufous, the feathers irregularly tipped with brown. Under tail-coverts uniform light rufous. Tail as in the female." Yarrell describes another young bird thus: "All the upper parts light and brown, each feather terminated with a spot of greyish white. Quill feathers tipped with buffy white; wing-coverts edged with grey and tipped with buffy white; tail-feathers red, the second in the middle black in the centre; under part of the body something like that of the female, but more barred with white, which is again intersected with brown lines."

Neither of these descriptions exactly agree either with the Yárkand bird above described or with other European specimens which I possess, and which tally precisely with this latter; but doubtless correctly represent other stages of the young bird's plumage, and I have therefore reproduced them. [*A. O. H.*]

TROCHALOPTERON SIMILE

plumage known? One specimen, a male, obtained in October at Bāramulla, Kashmir, is remarkable as having the whole head and neck (as well as the chin, throat, breast, and cheeks) black, some of the feathers changing to the olive brown that these parts always exhibit in winter. Is this an abnormal variety, or does this specimen indicate the full breeding plumage of the male? [*A. O. H.*]

418 (*bis*). **Trochalopteron simile** (Hume). (Pl. VII.)

This species was very common at Bāramulla, west of Srīnagar, in November, where several specimens were procured, but it was nowhere else observed by the Expedition.

My notes state that this species has a peculiar call that may be represented by the syllables *wheet-ooi-ooi*. The length was 10; expanse, 12; tail from vent, 5; legs and feet fleshy; bill black. [*G. H.*]

I have had considerable doubts as to the propriety of separating this race as a distinct species; it exactly resembles *T. variegatum* of Vigors, except that the ear-coverts are cinereous like the nape, and not dark brown, that the outer webs of the primaries are pure French grey, without any golden, olive golden, pink, or olivaceous tinge, and that the tail-feathers are more broadly tipped with white, and their terminal halves above the white tippings (like the outer webs of the primaries) pure French grey, without the slightest tinge of orange, golden, or olivaceous.

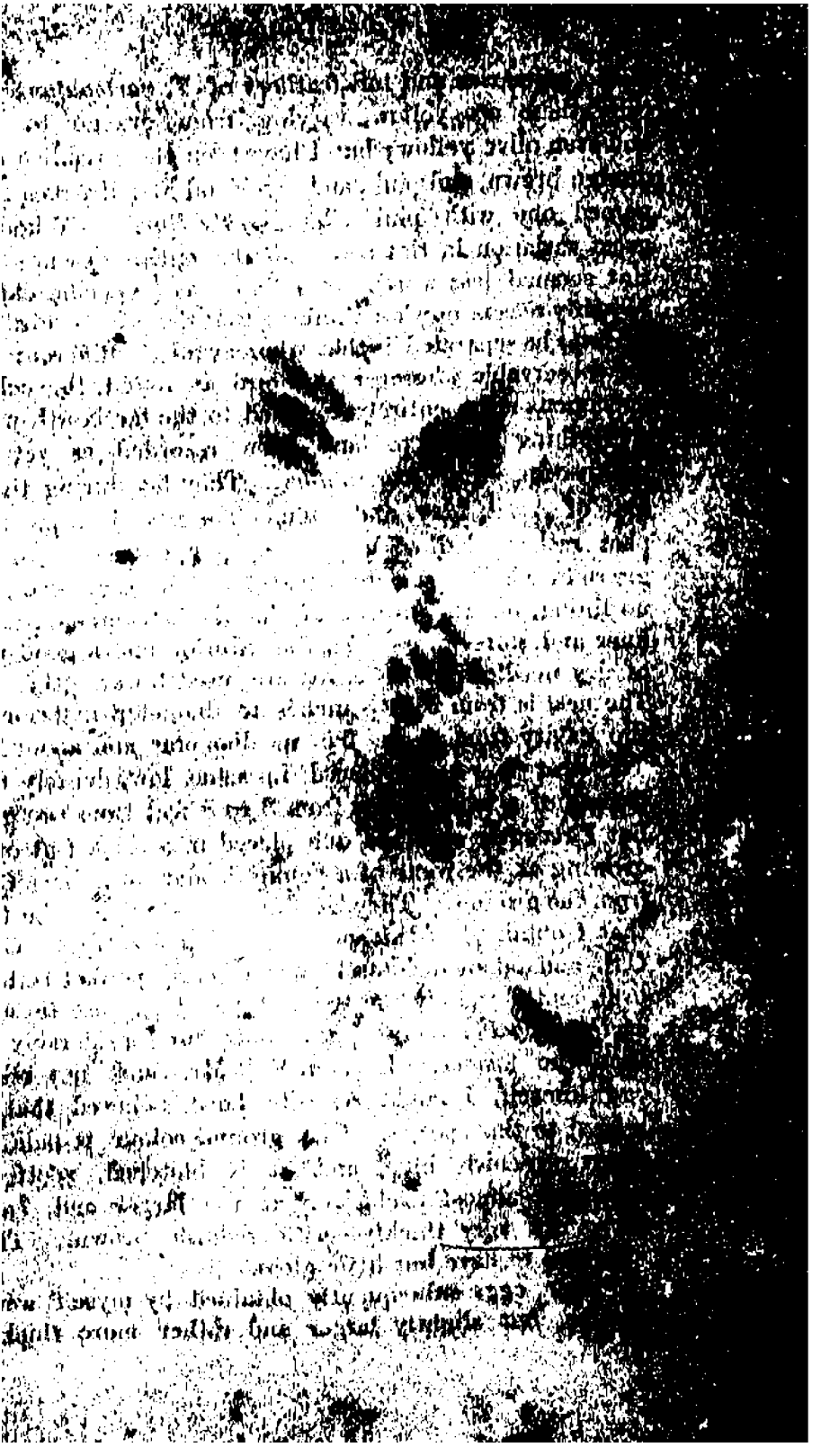
Several specimens killed at different seasons, and precisely similar to the one obtained by Dr. Henderson, were sent to me from the Agrore Valley, by Captain Unwin; and with numerous examples before me of both sexes, old and young, all exhibiting the same characteristics, there appears no option but to separate the race specifically. To judge from the series before me, the particulars noticed are independent, first of sex, secondly of season, thirdly of age; but it will require a very large series to make quite certain of these facts.

I should add that what has specially induced me to hesitate so long in characterizing this form as a distinct species, is the great variability of the colouring of edgings

of the primaries and tail-feathers of *T. variegatum*. Typically these are yellow, varying from orange to golden, and even olive yellow; but I have seen them reddish orange, orange brown, and pink, and my friend Mr. Brookes actually named one with pink edgings *T. Humei*. Where such great variation in tint occurred, the entire absence of *any* tint seemed less worthy of reliance as a specific character. My only reason now for thinking that the present bird should perhaps be separated, is that whereas all the different colours are observable wherever the bird is found, the colourless specimens seem entirely confined to the far North-west.

Nothing seems to have been recorded as yet of the nidification of *T. variegatum*. They lay during the latter half of April, May, and June. The nest is a pretty compact rather shallow cup, composed exteriorly of coarse grass, in which a few dead leaves are intermingled; it has no lining, but the interior of the nest is composed of rather finer and softer grass than the exterior, and a good number of dry needle-like fir-leaves are used towards the interior. The nest is from 5 to 8 inches in diameter exteriorly, and the cavity from 3 to 3·5 in diameter and about 2 deep. The nest is usually placed in some low, densely foliaged branch of a tree, at say from 3 to 8 feet from the ground; but I recently obtained one placed in a thick tuft of grass, growing at the roots of a young deodar, not above 6 inches from the ground. They lay four or five eggs. The first egg that I obtained of this species, sent me by Mr. G. C. Buck, C.S., and taken by himself, was a nearly perfect rather long oval, and precisely the same type of egg as those of *T. erythrocephalum* and *T. cachinnans*, but considerably smaller than the former. In fact, had Mr. Buck not taken the egg himself, I could scarcely have believed that it belonged to this species. The ground colour is pale, rather dingy greenish blue, and it is blotched, spotted, and speckled—almost exclusively at the larger end, and even there not very *thickly*—with reddish brown. The egg appeared to have but little gloss.

Other eggs subsequently obtained by myself were very similar, but slightly larger and rather more thickly and



TROCHALOPTERON LINEATUM.

boldly blotched, the majority of the markings being still at the large end.

The eggs vary from 1·07 to 1·15 in length, and from 0·76 to 0·82 in breadth. [*A. O. H.*]

425. **Trochalopteron lineatum** (Vigors). (Pl. VIII.)

The Streaked Laughing Thrush was very abundant from Gond all the way through Kashmir on the return journey in October. It was not observed on the upward journey (when, indeed, the brushwood and jungle must have been dense, and it was breeding), nor at any time in Ladák, &c. [*G. H.*]

This is, perhaps, the very commonest and most familiar of the Himalayan Babblers throughout their extent, at any rate from Darjeling to Murree, at heights from 3000 to 8000 feet south of the snowy range; but common as it is, we believe that it has not hitherto been figured.

This species lays from the end of April to the beginning of September, and, very possibly, occasionally even earlier and later. I took a nest on the 29th April near Masuri; Mr. Brooks obtained eggs in May and June at Almorah; Mr. G. Marshall at Masuri in July. I again took them in July and August near Simlah, and Captain Beavan found them as late as the 6th of September near the same station.

So far as my own experience goes, the nests are always placed in very thick bushes or in low thick branches of some tree, the deodar appearing to be a great favourite. Those I found averaged about four feet from the ground, but I took a single one in a deodar-tree fully eight feet up. The bird, as a rule, conceals its nest so well that, though a loose and, for the size of the architect, a large structure, it is difficult to find, even when one closely examines the bush in which it is. The nest is nearly circular, with a deep cup-like cavity in the centre, reminding one much of that of *Malacocercus canorus*, and is constructed of dry grass and the fine stems of herbaceous plants, often intermingled with the bark of some fibrous plant, with a considerable number of dead leaves interwoven in the fabric, especially towards the base. The cavity is neatly lined with fine grass roots, or occasionally very fine grass. The cavity varies from

three inches to 3·5 in diameter, and from 2·25 inches to 2·75 in depth; the walls immediately surrounding the nest are very compact, and the compact portion rarely exceeds from ·75 to 1 inch in thickness, beyond which the loose ends of the materials straggle more or less, so that the external diameter varies from 5·5 inches to nearly 10.

The normal number of eggs appears to me to be three, although Captain Beavan cites an instance of four being found. They are usually of a pale, slightly greenish blue, but vary somewhat in shade and intensity of colour. In shape they vary even more than in tint, since, although the common type is a rather long, slightly pyriform oval, some are nearly round, and one was almost as slender as a Swift's. The texture is only moderately fine, the surface fairly glossy. In size I have found them vary from 0·8 to 1·13 inch in length, and from 0·7 to 0·8 of an inch in breadth, but the average dimensions are 1 by ·75 inch.

Neither Dr. Jerdon's dimensions nor his description appear to me to represent our bird quite correctly, and I therefore subjoin* others taken by myself, which possess at least the merit (?) of pleasing *me* better! [*A. O. H.*]

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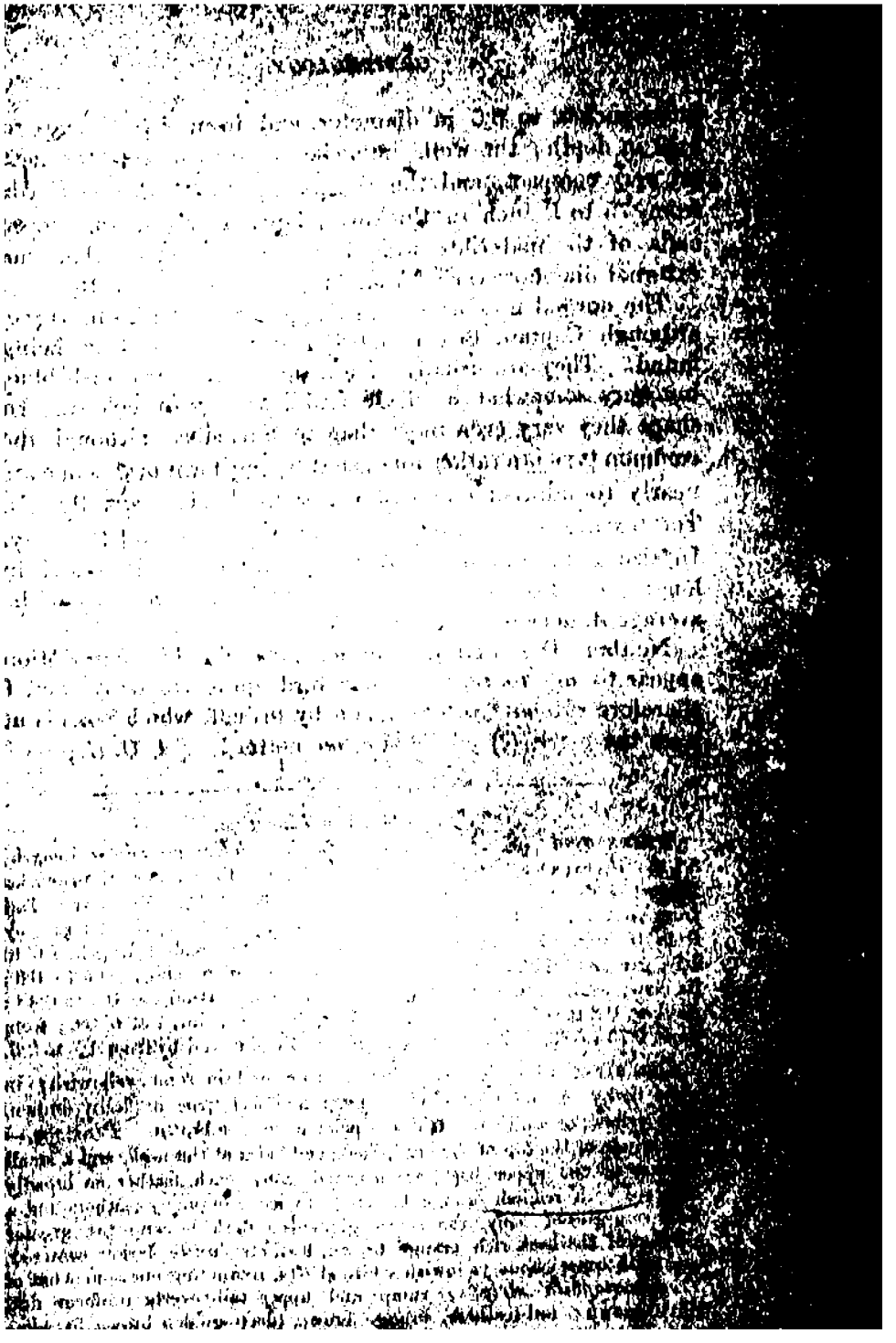
* *Trochalopteron Lineatum.*

Dimensions. (*Sexes do not differ in size; individuals do*).—Length, 8·1 to 9·1; expanse, 9 to 10; wing, 2·9 to 3·25. Fifth and sixth primaries longest or 6, and 5, up to 0·1 shorter—first 1·1 to 1·4 shorter. Tail from vent, 2·7 to 3·8. Central tail-feathers exceed exterior laterals by from 0·45 to 1·3. Tarsus, 0·9 to 1·12. Foot—greatest length, 1·6 to 1·7; greatest width, 1·1 to 1·3. Mid toe to root of claw, 0·65 to 0·8; its claw, straight from root to point, 0·2 to 0·3. Hind toe, 0·2 to 0·45; its claw, 0·3 to 0·4. Bill, straight from forehead to point, 1·42 to 0·6; from gape, 0·75 to 0·9. Closed wings fall short of end of tail by from 1·7 to 2·5.

Description.—Bill dusky brown, pale, and in some yellowish; in some fleshy on lower mandible. Legs and feet pale or fleshy brown, soles yellow, or whitish. Irides a paler or darker brown. *Plumage.*—The whole of the top of the head, back, and sides of the neck, and a small portion of the upper back, are greenish ashy, each feather so broadly centered with reddish orange brown as to leave in many feathers but a faint margin of ashy, the shafts glistening dark brown; the greater portion of the back rich orange brown, feathers faintly darker centered, and with conspicuous yellowish white shafts, reminding one somewhat of *Grammatophila striata;* rump and upper tail-coverts uniform dull olive brown; tail-feathers, orange brown (deep golden brown in some



CHATARRHÆA CAUDATA.

438. **Chatarrhœa caudata** (Dumeril). (Pl. IX.)

This species was very common on the low hills on the roads leading into Kashmir from the Plains of the Panjáb, as, indeed, it is in those plains and throughout India generally. [*G. H.*]

The specimens obtained near Púnch, one of which we figure, though perhaps slightly larger and darker than the majority of those found in the N.W. Provinces, do not at all come up to the dimensions assigned by Blyth to his *C. Huttoni* from Afghanistan.

This species is *said* to extend to the Philippines (Pucheran, Arch. du Mus. vii. p. 342). Neither this nor the nearly allied *C. Earlii* (Pl. X.) appear to have been as yet properly figured.

This latter species is common (of which fact Dr. Jerdon does not seem aware) throughout the Rohilcund Terai, and the north of Shahjehanpore, Bareilly, and Bijnaur, in the Dhoon, and the north of the Saháranpur district; nothing seems to have been recorded of its nidification. I have repeatedly taken its eggs, but prefer to any account of my own a brief note on the breeding of this species sent me long ago by Captain G. F. L. Marshall, R.E.: "In the Saháranpur district *C. Earlii* commences building about the middle of March, and the young are hatched towards the middle of April. The nest is usually placed in the middle of a tuft of Sarkerry grass, and sometimes in a bush or small tree, generally three or four feet from the ground; it

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lights), obsoletely and narrowly barred with a faintly browner shade, the feathers tipped with a pale dingy grey, and with a narrow subterminal dark band, both tipping and band being most conspicuous on the exterior tail-feathers, and becoming gradually less marked towards the central feathers, where they are almost obsolete. The wings are brown, the coverts and outer-webs of the primaries strongly tinged with the same colour as the tail. The lores are dusky, each feather tipped with yellowish white, and there is an incomplete irregular circle of tiny whitish feathers round the eye. The ear-coverts are rufous. The chin, upper portion of throat and cheeks dull ashy, the feathers centered narrowly with rufous, and mostly with paler shafts. The lower portion of the throat, chest, and abdomen a rich rufous or rusty brown, each feather conspicuously paler centered and with a narrow ashy, or in some yellowish white, margin; vent and lower tail-coverts a nearly uniform olive brown. [*A. O. H.*]

is a deep cup-shaped structure, rather neatly made of grass without lining, and woven in with the stems if in a clump of grass, or firmly fixed in a fork if in a bush or low tree. The interior diameter is about three inches, and the depth nearly two. The eggs, four in number, are of a clear blue colour without spot of any kind. In shape they are oval, rather thinner at one end; the shell is smooth and thin. The eggs are of the same colour, but considerably larger than those of *Chatarrhœa caudata*. *Chatarrhœa Earlii* breeds commonly in the Sub-Siwalik districts of the Dooab; it seems fond of water, as most of the nests I have found were close to the canal bank. It is gregarious even in the breeding season; small flocks of seven or eight keeping together, fluttering in and out of the low bushes, but seldom alighting on the ground, and occasionally making a noisy chattering cry, especially when disturbed."

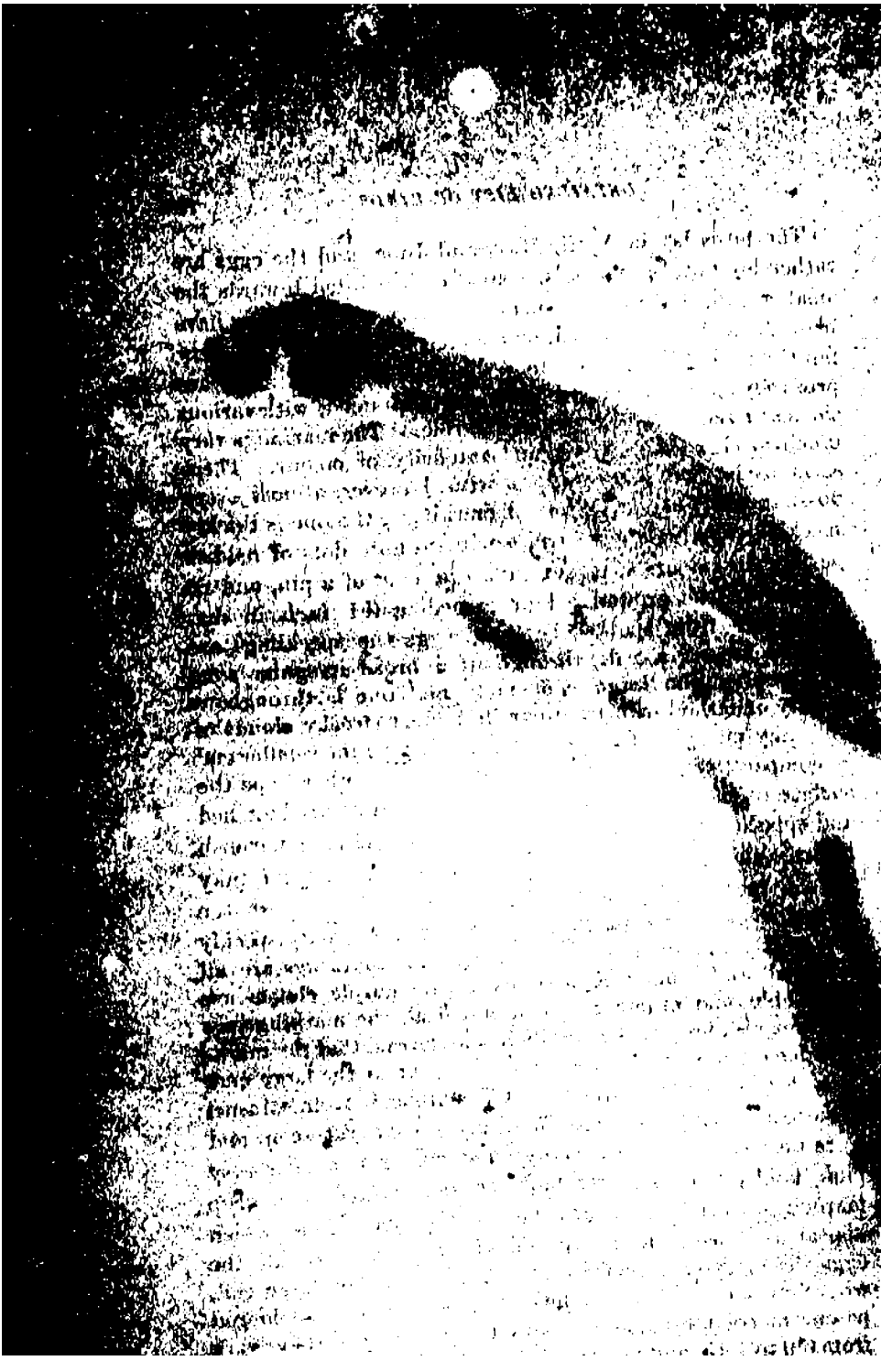
I may add that while the eggs of *Chatarrhœa caudata* (which greatly recall those of *Accentor modularis*) vary in length from 0·75 to 0·9, and in breadth from 0·6 to 0·7, those of *C. earlii* vary from 0·95 to 1·05 in length, and from 0·73 to 0·78 in breadth. [*A. O. H.*]

444. **Hypsipetes psaroides** (Vigors).

This species was common at Banihál on both sides of the pass leading from Jamu to Srínagar, but it was nowhere else observed. [*G. H.*]

The nest of *Hypsipetes psaroides* is very like that of some of the *Otocompsæ*. It is usually made of rather coarse-bladed grass, with exteriorly a number of dry leaves and more or less moss incorporated, and lined with very fine grass-stems and roots of moss. Its general shape is a moderately deep cup, the cavity measuring some two and a half inches in diameter by one and a half in depth. The sides, into which leaves and moss are freely interwoven, vary from an inch to a couple of inches in thickness; the bottom, loosely put together, is rarely more than from a quarter to half-an-inch in depth. It appears to be generally placed on the fork of a branch, at a moderate height from the ground.

CHATARRHÆA EARLEI.



The birds lay in April, May, and June, and the eggs are rather long ovals, typically a good deal pointed towards the smaller end, but at times nearly perfect ovals. They have little or no gloss; the ground colour varies from white, very faintly tinged with pink, to a delicate pink, and they are profusely speckled, spotted, blotched, or clouded, with various shades of red, brownish red, and purple. The markings vary much in character, extent, and intensity of colour. There seem to be two leading types, with, however, almost every possible intermediate variety of markings; the one is thickly speckled over its whole surface with minute dots of reddish purple, no dot much bigger than the point of a pin, and no portion of the ground colour exceeding 0·1 inch in diameter free from spots. In these eggs the specklings are most dense as a rule throughout a broad irregular zone surrounding the large end, and this zone is throughout thickly underlaid with irregular ill-defined streaky clouds of dull inky purple. In some eggs of this type the smaller end is comparatively free from specks. In the other type the surface of the egg is somewhat sparingly but boldly blotched and splashed, first with a deep umber, chocolate, or purplish brown, and secondly with spots and clouds of faint inky purple, recalling not a little the style of markings in the egg of *Rhynchops albicollis*. There are eggs partly speckly and partly blotched, some in which the markings are all rich red and where no secondary pale purple clouds are observable, and others again in which all the markings are dull purplish brown. Generally it may be said that the markings have a tendency to form a cap or zone at the large end.

A nest of three eggs recently obtained from Masuri were more richly coloured than any I have yet seen, and were decidedly glossy. The ground colour is a rich rosy pink, boldly but sparingly blotched and spotted with deep maroon, underlaid by clouds and spots of pale purple, which appear as if beneath the surface of the shell. In all the eggs the markings are far most numerous at the large end, where in one they form a huge confluent maroon-coloured patch, mottled lighter and darker. In length they vary from 0·9 to 1·15, and in breadth from 0·7 to 0·78. [*A. O. H.*]

458. **Otocompsa leucogenys** (Gray).

The White-cheeked Crested Bulbul was very common throughout Kashmir, both on our coming and returning. It was feeding on fruits and seeds. [*G. H.*]

These birds breed from April to July, and at all heights from 3000 to 7000 feet. The nest is a loose, slender fabric, externally composed of fine stems of some herbaceous plant and a few blades of grass, and internally lined with very fine hair-like grass. The nests may measure externally, at most, four inches in diameter, but the egg cavity, which is in proportion very large and deep, is fully two and a quarter inches across by one and three-quarters deep. As I before said, the nest is usually very slightly and loosely put together, so that it is difficult to remove it without injury; but sometimes they are more substantial, and occasionally the cup is much shallower and wider than I have above described.

The eggs are of the regular Bulbul type, as exemplified in those of *Pycnonotus pusillus*, and vary much in colour, size, and shape. Typically they are rather a long oval, somewhat pointed at one end, have a white, pinkish- or reddish-white ground with little or no gloss, and are thickly speckled, freckled, streaked, or blotched, as the case may be, with blood- brownish- or purplish-red; and here and there, chiefly towards the large end, exhibit, besides these primary markings, tiny underlying spots and clouds of pale inky purple. Some eggs have a pretty-well marked zone or irregular cap at the large end, but this is not very common. In size they average somewhat larger than those of *Otocompsa leucotis* and *O. emeria*, both of which they closely resemble; but they are smaller, and as a body less richly coloured than those of *Otocompsa fuscicaudata*. They vary in length from 0·84 to 0·95, and from 0·62 to 0·7 in breadth. [*A. O. H.*]

470. **Oriolus kundoo** (Sykes). (Pl. XI.)

The Indian Oriole was very common in Kashmir, both going and returning; it was there known as the *Pash-nool*. In June, when the Expedition passed northwards,

ORIOLUS KUNDOO

many of the birds were young. This species was again met with at Bora and Oi Tograk, in the plains of Yārkand. Only one specimen, a nearly adult female, was obtained. The Yārkandis call it the *Zar guldar*, a name apparently borrowed from the Persians. [*G. H.*]

It is most remarkable that the Yārkand bird should be identical with the Indian, and not the European bird (*O. galbula*). There is, however, no mistake about the matter, for both Colonel Tyfler and myself possess series of both species, and I have carefully compared the Yārkand bird with all of these. As to the distinctions between the two species, Dr. Jerdon says: "*O. kundoo* differs from the European *O. galbula* only in the black eye-streak extending to the ear-coverts, in the wing being shorter, and the bill proportionately longer." Professor Schlegel says that "*O. kundoo* is distinguished by the black of the lores extending round the eye and backwards behind the eye, by the yellow of the tail-feathers, and the exterior large coverts being greater in extent, and by the secondaries broadly tipped with yellow." Judging from my specimens I should say that *O. galbula* was a smaller bird with a somewhat shorter, but at the same time stouter bill, with a much more raised culmen, and a wing of say 6·25, against say 5·5 in *O. kundoo*. As remarked by both Schlegel and Jerdon, in *O. galbula* only the lores are black, while in *O. kundoo* besides these, a line over and behind the eye, in many cases extending partially over the ear-coverts, is also black. The yellow on the primary greater coverts and on the lateral tail-feathers is much more extended in *O. kundoo*; thus, in the male, of the feathers next the centre ones in *O. galbula* there may be 0·6 of the tip yellow, while in the same sex, of the same feather in *O. kundoo*, 1·5 of the outer and 1 of the inner web will be yellow. Again, on the external feather of *O. galbula* there may be 1·25 of the tip yellow, while in *O. kundoo* the whole feather is yellow except the merest trace of black at the extreme base.

The nidification of this bird has been repeatedly described, and I shall only add here that they lay from May to August, and that the eggs vary in length from 1·03 to 1·32, and from

0·75 to 0·87 in breadth, and that the average of fifty eggs measured was 1·11 by 0·1. [*A. O. H.*]

475. **Copsychus saularis** (Linn.).

This species was only observed in the low hills through which the road to Kashmir from the Panjáb first passes on leaving the plains. It never seems to ascend the hills to any great height. [*G. H.*]

Very discrepant accounts have been given of the nidification and eggs of this species, but I do not doubt that Captain Hutton was quite right, and that his "carneous cream-coloured" eggs verily belonged to this species. It is well known that eggs of Passerine birds, normally blue or bluish green, occasionally assume this pinky shade. I have several such of *Drymoipus inornatus*. Writing to me recently, Captain Hutton says:—

"*Copsychus saularis* arrives in the hills up to about 5500 feet in the beginning of April, returning to the Dehra Doon early in the autumn. In the Doon it breeds in May and June, constructing a shallow nest of fine woody flower-stalks intermixed with fine roots and the dry tendrils of climbing plants, with a little moss externally, and placed within a hole in some large tree, or in a bank or wall, where it lays five eggs of a pale bluish green, thickly spotted and blotched with purplish brown, and showing an imperfect ring of nearly confluent blotches at the larger end. There is, however, great variety both in the number and size of spots and in intensity of colouring; some being blotched as well as spotted, others being simply and uniformly freckled with rufous brown without any indication of a ring at the larger end, and in these the size is somewhat less. Having obtained five or six of these typical nests and shot the old birds for examination, there can be no doubt about the correctness of the foregoing remarks; yet at the same time I am still fully convinced that the nest and white eggs formerly noticed (*J. A. S. B.*) as having been taken from a hole in a bank was a mere accidental variety, for the nests are the same as to materials and situation, while the circumstance of the pinky-white eggs appears to me to be the

effect of some temporary derangement of the system, precisely as we sometimes detect a white specimen in the nest of the hill Mynah (*Eulabes intermedia*)."

Mr. Brooks, writing from Almorah, remarks correctly that "the nest is formed of the materials described by Dr. Jerdon, but in the hills moss is freely used."

This species breeds also throughout the plains of Upper India, but the majority resort during the nesting season to the Dhoons and Terais that skirt the Himalayas, and to the lower ranges of these latter. In the plains the nest is commonly placed in holes of trees, and composed of roots, fibres, and feathers. I myself have generally found them in May in Agra, Bareilly, and Etāwa. Captain Marshall, R.E., writing from Sahāranpur, says: "I send the bird and a pair of its eggs. I have found only one nest, and this was on the 23rd of April, in a hole in the wall of a building. The nest was made of fine twigs very neatly shaped, and lined with fibre; there were five fresh eggs in it."

Mr. F. R. Blewitt, writing from Saugor, remarks: "On the 29th June I found the nest in the hollow of a large dried limb of a Gooluc-tree (*Ficus glomerata*). It was made of coarse and fine grass and roots, placed to about the thickness of an inch at the base of the hollow; as to the *lining* there were a few horsehairs. The structure as a whole was circular, with a diameter of four and a half inches. The five eggs taken are of a pale green, with light brown spots and blotches; on some the brown spots coalesce towards the broad end."

The full complement of eggs is almost invariably five. They are typically oval, neither very broad nor narrow, but somewhat elongated; pyriform and almost globular varieties occur. They are moderately glossy. The ground colour varies as much as does the size and shape of the egg. In some it is greenish, in others greenish-white, while in others it is a beautiful pale sea-green, or again a delicate pale, only *slightly* greenish *blue*. Many of the eggs are perfect miniatures of eggs of *Merula simillima*, and recall varieties of the English Blackbird, which, indeed, is almost the only English egg with which I am familiar to which their

colouring at all closely approximates. They are all streakily blotched and mottled with different shades of brownish-red, some comparatively thinly, generally somewhat densely, and occasionally so closely as to leave but little of the ground colour visible. In all cases the markings are most numerous at the large end, where they very commonly form a conspicuous irregular mottled cap. Occasionally, but rarely, small specks and spots take the place of streaky blotches, and the smaller end is almost entirely free from markings. Faint underlying spots of pale inky purple are traceable in a few specimens. In the extent and bold streaky character of their markings, these eggs seem to me to stand apart from those of most of the other genera of the *Lusciniinæ*; though they are most nearly related to those of the *Thamnobia*. It is noteworthy that some specimens of the eggs pretty closely resemble the peculiar variety of the Nightingale as figured by Mr. Hewitson. (Pl. xxxiii. fig. 2.) In size they vary from 0·78 to 0·95 in length, and from 0·6 to 0·75 in breadth, but the average of fifty eggs measured was 0·87 by 0·64. [*A. O. H.*]

483. **Pratincola rubicola** (Linn.).

This species was found throughout Kashmir and in Yārkand, on the banks of the Karakásh river, and wherever there was grass and low jungle, but not otherwise. [*G. H.*]

One specimen procured near Jhélam in November, and two specimens procured in September at Shahidulla, Yārkand, are of the typical *P. rubicola* race, whilst the males procured in June in Kashmir are smaller and of the intensely black *P. indica* type.

I do not expect to convince others, but I have now satisfied *myself* that, contrary to the opinion I once held, *Pratincola indica* is not a good species. From every local division of India, hills and plains, from which I have received *P. indica* I have also obtained *P. rubicola*. Three out of fifteen European specimens must be referred to *P. indica*. Intermediate forms are everywhere common. All that can be said is that in certain localities the majority of the birds incline to the *P. indica* type,

while in certain others the *P. rubicola* type chiefly prevails; this does not constitute a specific difference according to my ideas. [*A. O. H.*]

486. **Pratincola ferrea** (Hodgson). (Pl. XII.)

This very common, but hitherto apparently unfigured Himalayan species, was only observed by the Expedition at Bhimber, at the very foot of the hills leading into Kashmir from the plains. [*G. H.*]

Though so common everywhere from Darjeling to Murree, south of the first snowy ranges, it is very rare beyond them, only occurring, as far as I have observed, in valleys of rivers that pass, like the Sutlej and Jhélam, through vast gaps in these ranges. It should certainly have been met with in Kashmír, as I have seen specimens obtained there in the valley of the Jhélam. The bill of this species is quite that of a typical *Muscicapa*, and though the legs and wings, and indeed habits, justify, perhaps, its location in the closest proximity with the true *Pratincolæ*, I must confess that I consider it deserving of generic separation from such birds as the Stone and Whin Chats. I will, however, leave it to some of our foreign brethren to propose one of those purely classical and easily pronounceable generic names which their souls love, such as *Jacamaralcyonides* or its equivalent *Galbalcyrhynchus*.

P. ferrea (magnified).

492. **Saxicola atrogularis** (Blyth).

The Black-throated Wheatear was common in Ladák, from Karbu to Lé, and, indeed, almost to the Pángong Lake, and again in the Lower Karakásh Valley and the plains of Yárkand. A nestling was obtained on the 5th of August at Bálakchi, on the Karakásh, showing that the bird breeds in this neighbourhood. [*G. H.*]

A male killed on the 26th of June on the Namyikka Pass (12,000ft.) in Ladák, exhibits the characteristic breeding plumage which, as I long ago pointed out, Gould has

erroneously elevated to the dignity of a distinct species, and figured as *Saxicola montana*.

492 (*bis*). **Saxicola Hendersoni** (Hume). (Pl. XIII.)

This species, which Mr. Hume believes to be new, was found at the Arpalak River near Sānju, and at Koshtak, twenty miles further north. They were found in fields, little patches of cultivation on the borders of the desert, and were associated with *S. atrogularis*. [*G. H.*]

Dr. Adams remarked in the "P. Z. S." for 1859, p. 180: "At the salt lake in Ladák, on one occasion, a bird evidently of this genus (*Saxicola*) was observed about the size of a Whinchat; upper parts a bluish black, breast black, belly and lower parts white; a specimen was not procured." It is just possible that the species thus referred to may be the present one; it is a *Saxicola* of the same type as *S. atrogularis* and *S. deserti*, but smaller and more slender than either, and has the whole of the back and wing coverts and wings a sort of bluish black, the feathers more or less margined and tipped with pale fawn colour, and the tail, which would be very conspicuous in flying, is entirely white, except the terminal portions of the two central, and a comparatively narrow (and on all but the exterior ones almost obsolete) black or blackish brown band on the laterals.

Dimensions.	Male.	Male.	Male.	Female.	Female.
Length	6·5	6·	6·	5·75	5·75
Expanse	11·5	—	—	—	—
Tail	3·	2·2	2·3	2·	2·2
Wing	3·95	3·75	3·75	3·7	3·5
Bill at front	0·45	0·45	0·46	0·45	0·45
Tarsus	0·95	0·93	0·95	0·9	0·94
Wings when closed fall short of tail by	1·	—	—	—	—

Description.—The bill, legs, and feet are black.

Plumage.—*Male.*—The lores, a narrow band on the forehead, cheeks, ear-coverts, chin, throat, upper portion of breast, and sides of neck, black; a colour that in winter plumage would doubtless be more or less concealed by pale tips to the feathers, which are already beginning to

SAXICOLA HENDERSONI.

show themselves in the specimens killed early in September. A narrow band from the forehead over the eye, and ear-coverts fawny white. Front, top, and back of the head, and back of the neck, grey brown. Possibly in full breeding plumage these parts may be white, because on lifting the feathers the medial portion of each feather is shown to be white, the tips only brown, the bases dusky. In the specimen which has assumed least of the winter dress the medial white portion is far broader and more conspicuous than in other specimens further advanced towards the winter plumage.

Wings, scapulars, and interscapulary region black, probably in full breeding plumage nearly pure black; but in the September specimens all the feathers of the back are so tipped with rufous brown that the black is greatly concealed, and all the coverts, tertiaries, and secondaries are broadly margined with rufous fawn. Rump and upper tail-coverts pure white, central tail-feathers black, except for the basal one fourth, where they are white; lateral tail-feathers white, the exterior on each side tipped for about 0·75 with black, the penultimate similarly tipped for about 0·4, and the rest with only a black spot at the tip, decreasing in size as the feathers approach the central ones, and disappearing entirely in some specimens. Lower breast and abdomen rufous fawn, paling towards the vent, which, with the lower tail coverts, is in some specimens nearly pure white. Wing lining, axillaries, and sides black, but a little white mottling along the edge of the wing at the carpal joint.

The *females* have the foreheads and a stripe over the eye rufous fawn colour, the lores slighly dusky, the ear-coverts more rufous. Chin, throat, and sides of the neck nearly unicolorous with the breast, which is as in the male, but the chin and throat are slightly greyer. The front, top, and back of the head and neck, and back, are slightly rufous grey brown, the bases of the feathers being rather pale bluish dusky. The wings and tail are as in the male, but with dark brown substituted for black. [*A. O. H.*]

496 (*bis*). **Ruticilla erythroprocta** (Gould).
(? 496. Ruticilla rufiventris, Vieillot.)

Numbers of this supposed species were met with from Lé up to the Pángong Lake, and again in Yárkand at the foot of the hills. [*G. H.*]

Procured at widely different dates, the specimens tend to throw much doubt upon the value of this newly separated species, and after comparing them with a vast series of *R. rufiventris* and of the so-called *R. phœnicuroides* of Moore, which are undoubtedly different forms of the same species, I experience great difficulty in believing that *R. erythroprocta* is anything but the full breeding plumage of *R. rufiventris*. So far as the gradation of plumage goes no links seem to be wanting, but it did appear at first that the bills of the *R. erythroprocta* type were somewhat larger than those of *R. rufiventris*. On further examination this difference in size appeared to be chiefly due to the frontal feathers in *R. rufiventris* being some fuller and longer, and covering up more of the bill; in the bills themselves, when entirely divested of feathers, it is not clear that there is any real difference in size and the length of the frontal plumes, and the extent to which they extend over the upper mandible doubtless depends upon the season. In one specimen the whole of the back, coverts, head, neck, throat, and breast are black; there is a narrow (slightly greyish) white band across the forehead about three-eighths of an inch above the base of the upper mandible, and behind this the feathers of the crown and nape have a faintly ashy tinge. In other specimens this white frontal band is greyer and extends further back, and the whole of the nape and upper back are more or less overlaid with ashy. In specimens later killed, again, the frontal band has spread over the whole crown, and has become pale grey throughout. In the next stage the bird is undistinguishable from the *R. phœnicuroides* of Moore, which we obtain in the plains, and which is the August plumage of *R. rufiventris*.

I do not positively assert that *R. erythroprocta* is not a good species, but what I submit is that I have specimens

which correspond precisely with Mr. Gould's figure, and that between these specimens and the dull winter plumaged *R. rufiventris* I have procured partly in the plains and partly in the hills every intermediate stage of plumage, and I have besides this a stage which I believe to be immediately anterior to the *R. erythroprocta* dress, in which the whole head, back, and breast are black, and there is no trace of *any* frontal band. According to my view the frontal band first appears about May or June, as a narrow nearly pure white stripe; a grey tint spreads gradually from behind it; the band by degrees extends further and further back, losing its purity of colour as it does so, while the grey shade which extends behind it spreads further and further down the back, becoming purer and purer grey as time passes on, until the frontal band and the shade merge in one another, and the whole upper surface has become an uniform dull brownish grey.

I may remark that the extent to which the black extends on the breast varies excessively in individuals in even precisely the same stages of plumage, and is of no specific value whatever.

Numerous nestlings of this species were obtained; the bird itself was excessively common, and must have hatched in June. If this species be not identical with *R. rufiventris* the question arises, What becomes of *R. rufiventris?* and where does *R. rufiventris* breed? It absolutely deserts the plains of India and the lower hills by the end of April, and in all the innumerable collections made in the Himalayas, which I have examined, many of them far in the interior from Darjeling to Murree, I have never met with a single specimen of the *rufiventris* form killed within these limits between the end of May and the beginning of August. Specimens killed in August, both in the plains and in the hills, are of the *R. phœnuroides* type, while those killed in April are generally of the pure black type.

The upper surface of the early July specimens is excessively close to that of *R. tithys*, but the wings of course want the white patch, and the grey portion of the head just above the lores, and the black frontal band are paler and

more markedly greyish white, presenting the appearance of a band like that of *R. phœnicura*, but neither so pure a white as in that species, nor contrasting at all so strongly with the rest of the crown.

Of the young birds the general style of colouring is of course the same as that of the females, but the brown of the upper parts has a certain olive tint very different from the earthy line of the latter, and the lower parts have the feathers of the throat and breast darker and more or less indistinctly centered with a sort of golden buff, while the abdomen and vent are decidedly buff. [*A. O. H.*]

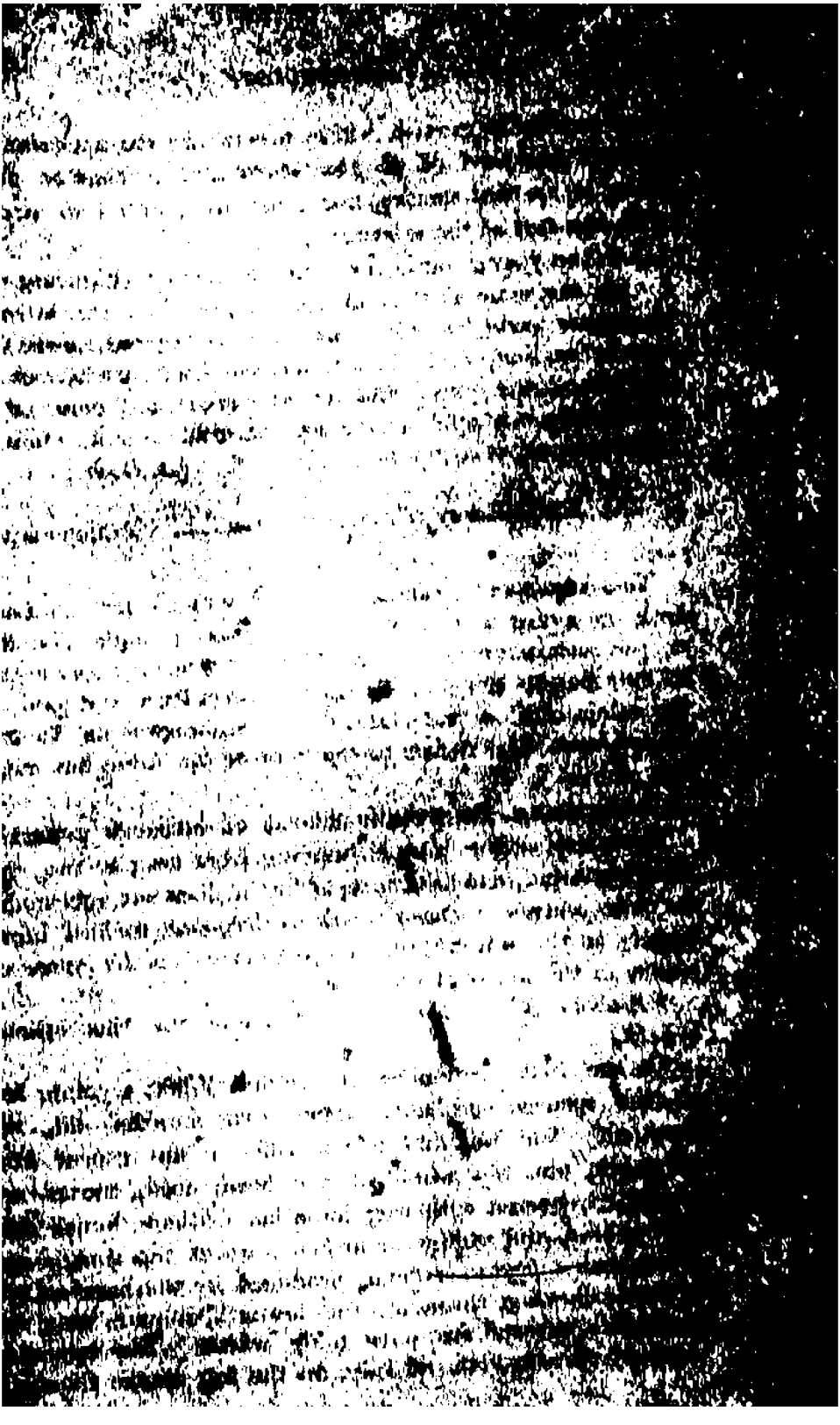
499. **Ruticilla erythrogastra** (Guld.). Guldenstadt's Redstart.

This handsome Redstart was met with all through Ladák both in going and returning, and was specially abundant on the return journey in October. It was found as high as 17,800 feet on the snow in the Chang-la Pass, and again on the other side of the plateau it was observed in Yārkand from about 15,000 feet to the foot of the hills, but not in the plains.

It frequents the neighbourhood of streams generally, where there is low jungle, hopping from twig to twig and on the ground, catching insects, but it does not appear, like its near relative *Chæmorrornis leucocephala*, to feed immediately at the water's edge or to venture on the rocks and stones in the midst of torrents.

"*Kuchkatch*" is the Kirghiz name for this species. [*G. H.*]

On the 14th September, at Kitchik Yilák, a young bird of this species, probably about two months old, was obtained. The tail and wings differ in no respect from the adult, but the whole of the head, neck, throat, and breast are covered with very loose lax feathers, bluish grey at the base, and yellowish brown towards the tips, a sort of mottled appearance being produced by the bases of the feathers showing through; the lower abdomen, vent and lower tail coverts are pure buffy white. The specimen obtained on the 11th of July, on the top of the Chang-la



RUTICILLA CÆRULEOCEPHA[illegible]

Pass, differs in having the whole of the crown and nape pure white, instead of bluish white, as in the autumnal specimens, and further, in having this white head-patch sharply defined against the black of the back, instead of, as in the autumn specimens, shading off gradually to the lower back. This was the first specimen preserved, and probably represents the full breeding plumage.

Only three females were obtained, and these, as well as others in my museum, absolutely want the wing patch. The whole upper surface, including the wings, is a pale dull earthy brown; the rump and tail are much as in the male, but somewhat paler; the chin and throat and upper breast are a sort of mixture of the dull pale earthy brown of the upper surface with pale rufous, and the abdomen, vent, and lower tail coverts are rufous fawn, brightest upon the lower tail-coverts and palest in the middle of the abdomen. The bird figured by Gould (B. of A., Pl. III.) as a female or young male must certainly have been the latter. [*A. O. H.*]

503. **Ruticilla frontalis** (Vigors).

This species was very plentiful in Kashmir, but only on the return journey in October. It was always observed hopping from branch to branch in brushwood and dense jungle, feeding on insects. The following are the dimensions of a male: Length, 6; tail from vent, 2·5; expanse, 9; foot, greatest length, 1·25; wings when closed reach to within 1 of end of tail. [*G. H.*]

504. **Ruticilla cœruleocephala** (Vigors). (Pl. XIV.)

This species was only met with in the Sind Valley and at Púnch, on the way down from Kashmir. Dr. Henderson notes the dimensions of a male. Length, 6; tail from vent, 2·75; expanse, 10; wings when closed reach to within 1·12 of end of tail.

Mr. Blyth correctly points out that the female* is not,

* Dr. Jerdon's dimensions also differ widely from the results of my measurements.

Of a male.—Length 5·8 to 6·0; wing 3·12; bill at front 0·36; fourth and fifth quills equal, sixth and third equal. In winter plumage, both the black and the blue of the male are so concealed by pale brown or rufous tippings, that even the male is not easily recognised from Dr. Jerdon's

as Dr. Jerdon supposes, very similar to, but in fact *very* different from, the male. The intensely deep ferrugineous upper tail coverts distinguish the female of this species from every other Indian bird for which it could possibly be mistaken. [*A. O. H.*]

505. **Ruticilla fuliginosa** (Vigors). (Pl. XV.)

Curiously enough, this species was never observed by the expedition anywhere, except at Púnch, below the Haji Pír Pass, on the way down from Kashmir. [*G. H.*]

Throughout the lower ranges of the Himalayas, south of the first snowy ridge, every stream from 1000 to 5000 feet elevation is haunted by numerous pairs of this sprightly and intrepid little bird. No account seems ever to have been given of the nidification of this species. I have never myself seen the nest, but the eggs have been sent me both by Captain Cock, from near Dharmsal, and by my own collectors, from the Valley of the Sutlej.

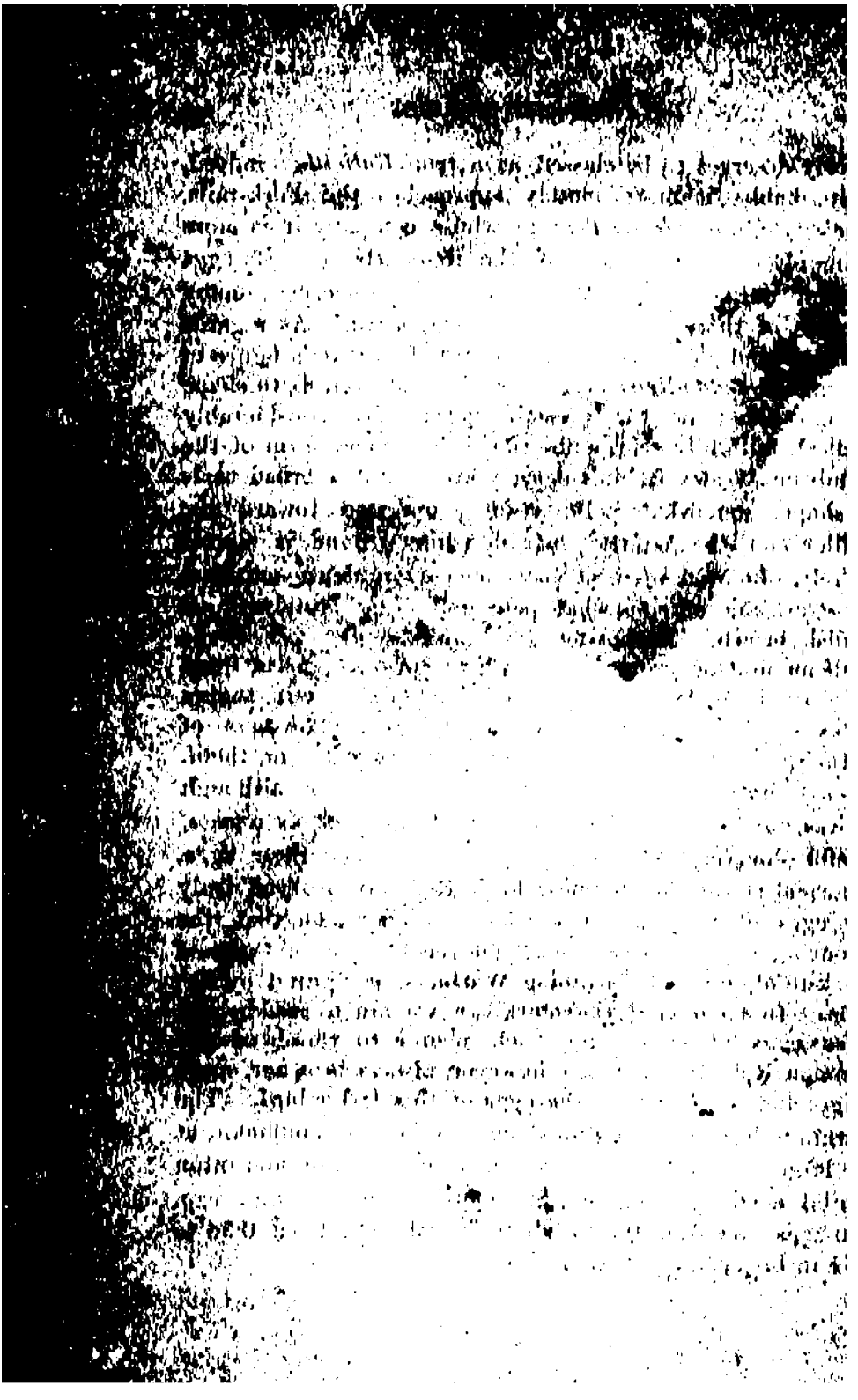
The birds breed in May and June, laying three, four, and even five eggs, in the immediate vicinity of running water. One nest, found in a hole in a rock, was composed of fine grass and moss roots, with a little moss—a very slight nest, little more than a lining to the hole. Another was described as far more substantial, planted in a niche of a rock, with some few dry leaves and much moss intermingled in the structure.

Canon Tristram remarks that the eggs of Ruticilla are *never* spotted, though the ground colour varies from pure white (in the single case of *R. tithys*) to the most delicate white with a faint bluish tinge (in *R. moussieri*), up to the very dark blue of *R. semirufa*.

If this generalization be correct the present species

description. As for the female, she is dull dark olivaceous brown above, tinged with rusty on the rump, and with the upper tail coverts deep ferruginous. Throat, breast, and flanks dull earthy brown, somewhat paler than back. Abdomen, albescent. Lower tail- and under wing-coverts, nearly pure white. Tail, blackish brown. Wings, dark brown. Tertiaries, edged pale rusty. Some of the wing coverts with more or less of white or pale tippings. Chin, and a scarcely perceptible frontal line, albescent.

RUTICILLA FULIGINOSA.



scarcely deserves to be classed as a true *Ruticilla*; indeed, in its habits it more closely approaches the Fork-tails, *especially Henicurus scouleri*, in whose company it is more commonly found than any of the Redstarts, and its eggs are not unlike, so far as coloration is concerned, many varieties of those of *Motacilla madraspatana*. As regards character and colour of markings, Mr. Hewitson's figure of the egg of *Calandrella brachydactyla*, and even as to shape (though those of the present species are considerably smaller), faithfully represents the most typical form of the Plumbeous Water-Robin's eggs. More or less broad ovals in shape, somewhat pointed or compressed toward the smaller end, the faintly greenish white ground is almost entirely obscured in most specimens by a dense mottling and freckling of somewhat pale and dingy yellowish or reddish brown. Except for the faint tinge of green in the small amount of ground colour that appears, some of these are very similar to those of several species of our Indian Larks; unless, indeed, a somewhat greater fineness of texture and glossiness of surface help to separate them. To say nothing of my own collectors, who, although natives, are very reliable men, Captain Cock is a *most* careful observer, and I entertain no doubt that these eggs, abnormal as they may appear for a Redstart, are yet truly the eggs of the present species. I may add that the colouring of these eggs somewhat recalls that of those of the Sub-alpine and Sardinian Warblers, as figured by Dr. Bree. In some eggs the markings are much redder, and these eggs of course approach nearer to those of the common Robin. They are, however, always browner, more dingy, and smaller than the eggs of this latter bird. The markings have a strong tendency to become confluent at the large end, where they are always most dense, and often exhibit a strongly marked, but mottled and irregular cap. The eggs vary from 0·7 to 0·8 in length, and from 0·56 to 0·64 in breadth. [*A. O. H.*]

506. **Chæmorrornis leucocephala** (Vigors).

This is another species which was only procured in the neighbourhood of Púnch. The dimensions of a male are as follows:—Length, 6·75; tail from vent, 3·12; expanse, 11; foot, greatest length, 1·62; wings, when closed, reach to within 1·5 of the end of the tail. [*G. H.*]

514. **Cyanecula suecica** (Linn.).

This species, the true Swedish Blue Throat, "*pectore ferrugineo,*" was only obtained at the Khush Maidan or Happy Plain (so called on the *lucus a non lucendo* principle, it being one of the most miserable deserts in creation) at an elevation of 16,000 feet; at Shahidulla, at about 11,000 feet; and at Sànju, about 6000 feet, where, by the way, one quite young bird was obtained, proving that this species also breeds in Yārkand. [*G. H.*]

In each case the specimens were obtained in the immediate neighbourhood of running water. They differ in no way from specimens procured in various parts of the plains of India during the cold season. Of course to the plains it is merely a winter visitant, and heretofore its breeding domicile has been unknown, its nest never having been met with in the Himalayas, so far as they are open to European travellers.

It is extraordinary how rare in India is the race with the satin-white spot in the midst of the blue, the *C. leucocyanea* (Brehm.) I possess only two specimens, and out of several hundreds, have only seen four of this race. *C. Wolfi* (Brehm) with the wholly blue breast is much more common, but the vast majority of our Indian birds belong to the typical *C. suecica* form. [*A. O. H.*]

515. **Acrocephalus brunnescens** (Jerdon). (Pl. XVI.)

This species was very common in Kashmir, where it breeds. [*G. H.*]

To the major portion of the plains of India, it is, I believe, merely a winter visitant; at any rate I have never

ACROCEPHALUS BRUNNESCENS.

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obtained specimens during the hot season or rains, nor have any of my contributors ever found the nest in the plains. [*A. O. H.*]

Wing of Acrocephalus brunnescens.

544. **Drymoipus longicaudatus** (Tickell).
(Pl. XVII., fig. 2.)

This species was common everywhere in the plains of the Panjáb and the low hills, through which the several roads lead thence into Kashmir. It was not observed elsewhere. [*G. H.*]

Neither this species, nor the nearly allied *D. inornatus*, Sykes (Pl. XVII., fig. 1), seem as yet to have been figured. The nest and eggs of both species are very similar. The nest of *D. inornatus* given in the annexed wood-cut is an exact copy of one photographed *in situ*.

Both species (in Upper India at any rate) lay in July and August, but nests still containing eggs may be met with as late as the first half of September. In the Neilgherries, *D. inornatus* lays as early as April. This bird constructs a very elegant nest always closely and compactly woven of very fine blades of grass, in no nests exceeding one-twentieth inch in width, and in many not above half of this. This grass is always used when fresh and green so as to be easily woven in and out. Both parents work at the nest, clinging at first to neighbouring stems of grass or twigs, and later to the nest itself, while they push the ends of the

grass backwards and forwards in and out. In fact, they work very much like the *Baya* (*P. baya*), and the nest, though much smaller, is in texture very like that of this latter species, the great difference being that the Baya chiefly uses *stems*, and the *Drymoipus* strips of *blades* of grass. The nest varies in shape and in size according

to its situation; a very favourite locality is in amongst clumps of the *sarpatta*, or the serpent grass, in which case, the bird builds a long and purse-like nest, attached above and all round to the surrounding grass-stems with a small entrance near the top; such nests are often eight or nine inches in length, and three or even more in external diameter, and with an internal cavity measuring an inch and

a half in diameter and having a depth of nearly four inches below the lower margin of the entrance-hole. At other times they are hung between bare twigs and are then nearly globular, with the entrance-hole near the top; they are then probably three and a half inches in external diameter in every direction. In other cases they are hung to or between two or more leaves to which the birds attach the nest, much as a Tailor bird or *Prinia* would do, using, however, fine grass instead of cobwebs or cotton wool for the thread. I have never found more than five eggs in any nest, and four is certainly the normal number.

The eggs are a moderately long and generally a pretty perfect oval, often pointed towards one end; sometimes globular, seldom if ever much elongated. The shell is fine and glossy and comparatively thick and strong. The ground colour is normally a beautiful pale greenish blue, most richly marked with various shades of deep chocolate and reddish brown; nothing can exceed the beauty or intricacy of the markings, which are a combination of bold blotches, clouds and spots, with delicate intricately interwoven lines, recalling, though more elaborate and I think finer, those of our early favourite the Yellow-ammer's eggs. The markings are invariably most strongly defined at the large end, where there is very commonly a conspicuous confluent cap, and the delicate lines are almost without exception confined to the broader half of the egg. Very commonly the smaller end of the egg is entirely spotless, and I have a beautiful specimen now before me in which the only markings consist of a ring of delicate lines round the large end. Some idea of the delicacy and intricacy of these lines may be formed when I mention that this zone is barely one-tenth of an inch broad, and yet in a good light between twenty and thirty interlaced lines making up this zone may be counted. The intricacy of the pattern is in some cases almost incredible, and what with the remarkable character of the patterns themselves, and the rich and varying shades of their colours, these little eggs are I think amongst the most beautiful known. Occasionally the ground colour of the eggs instead of being bright greenish blue is a pale rather

dull olive green; and still more rarely it is a clear pinkish white. These latter eggs are so rare that I have only seen six in about as many hundreds.

In size the eggs vary from 0·53 to 0·7 in length and from 0·43 to 0·5, in breadth, but the average of 120 eggs measured was 0·61 by 0·45. [*A. O. H.*]

546 (*bis*). **Suya albosuperciliaris** (Hume). (Pl. XVIII.)

A single specimen of this remarkable bird was obtained on the 10th of September, on the Yārkand plains, at Koshtak, an oasis in the desert, where a few fields of peas, barley, and wheat fringe for a breadth of a few hundred yards a small stream that further on loses itself in the desert. For a distance of from twelve to twenty miles in either direction an absolute desert of shifting sand and gravel stretches away to the horizon. Numerous small birds frequented these isolated fields, where the Common Swallow too was particularly numerous, but of the species now under consideration only a single individual, a female, was procured. [*G. H.*]

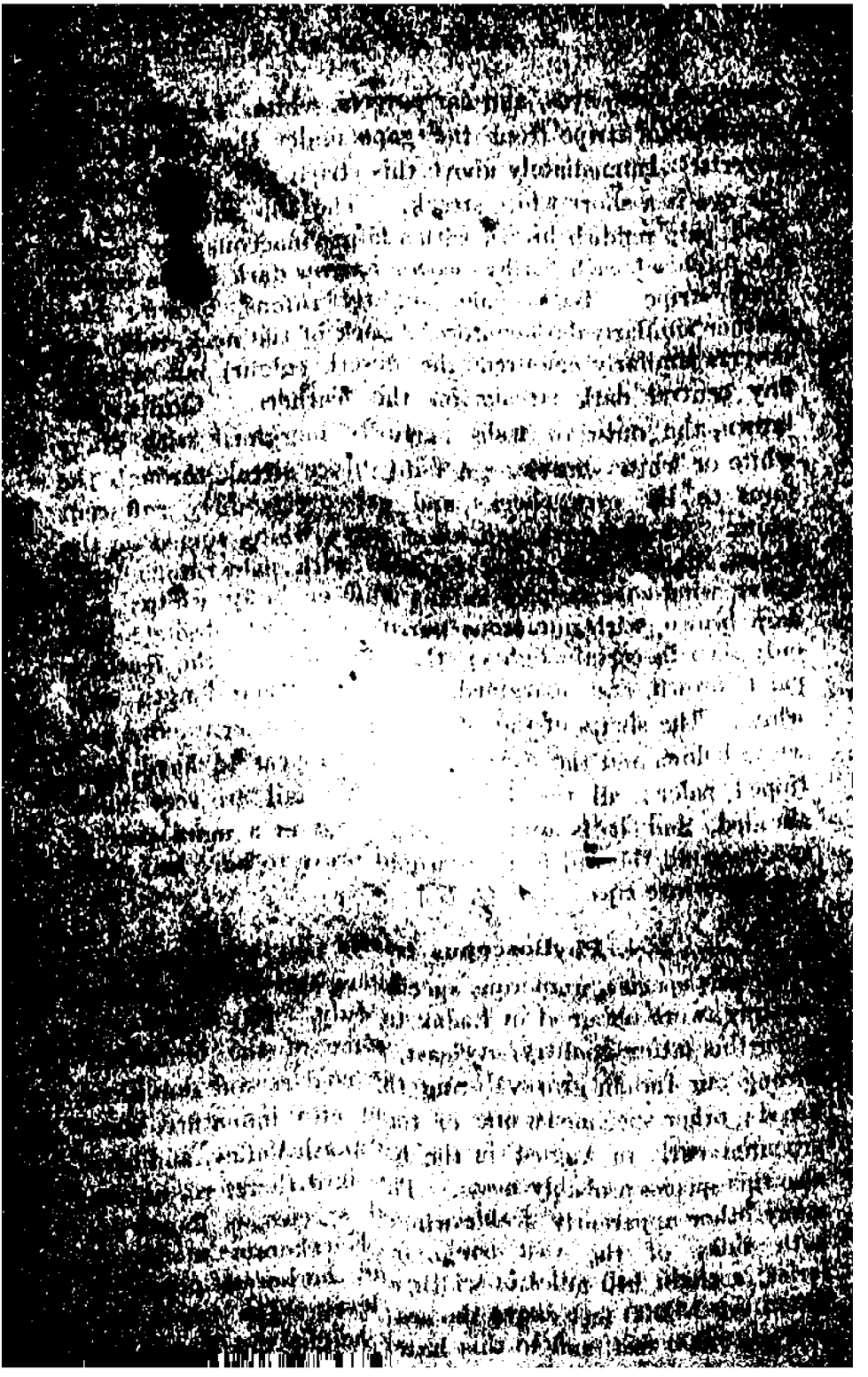
Structurally this bird is more closely allied to the *Suyæ* than to any other of the Indian *Drymœcinæ*. There is, however, a slight difference in the shape of the wings. In *Suya criniger* and *S. fuliginosa* the fourth quill is the longest, the fifth and sixth are nearly equal to it, and the eighth equals the third. In *S. atrogularis*, the fifth is longest, the fourth and sixth sub-equal, and the eighth to the third; in our present bird the fifth and sixth are longest, while the third is equal to the seventh; moreover, it is a stouter and larger bird than any of the Indian species, and it will probably hereafter be considered deserving of generic separation.

Dimensions.—Length, 7; expanse, 8; tail from vent, 4; wings when closed reach to within 2·5 inches of end of tail. Wing, 2·5; bill at front, 0·55; tarsus, 0·95; hind toe and claw, 0·55.

Description.—Legs and feet flesh coloured; bill brown; lower mandible fleshy except at the tip.

Plumage.—A long superciliary stripe from the nostrils

SUVA ALBOSUPERCILIARIS.



over the lores, eyes, and ear coverts, white. A dark brown moustachial stripe from the gape under the eyes and ear-coverts. Immediately above this stripe and directly under the eye is a short white streak. The top and back of the head, pale reddish brown with a faint vinaceous tint towards the forehead, each feather with a narrow dark brown central shaft stripe. Back, pale, slightly rufous, brown: each feather similarly dark centered; back of the neck, rump and coverts similarly coloured (the desert colour) but without any central dark streaks on the feathers. Quills, pale brown, the outward webs narrowly margined with dingy white or whitey-brown. A faint dusky streak through the lores to the eyes, cheeks and ear-coverts dirty rufescent white. Chin, throat, and lower parts, white, tinged on the breast, flanks, and tibial feathers with pale rufous buff; lower wing-coverts, pale rufous buff or buffy white; tail, dark brown, with numerous narrow close-set obsolete bars only seen in certain lights; the outer webs of the feathers paler brown and margined throughout their length with white. The shafts of the tail-feathers are brown above and white below, and the exterior laterals appear to have been tipped paler; all the feathers of the tail are very much abraded, and it is quite possible that in a more perfect specimen all the tail feathers would prove to have had paler or even white tips. [*A. O. H.*]

554. **Phylloscopus tristis** (Blyth).

Of this species, numerous specimens, and one of them a nestling, were obtained in Ladák in July. [*G. H.*]

In this latter country, at least, some of the birds that throng our Indian groves during the cold season doubtless breed; other specimens, one of them also immature, were procured early in August in the Karakash Valley, and here also this species probably nests. This bird therefore, like so many other apparently feeble-winged species, is found on both sides of the vast irregular Karakoram mountain series, a chain 140 miles in width, and the lowest points of which are 13,000 feet above the sea level. The passes are nearly 19,000 feet, and to this latter height the bird must

ascend if they do, as seems probable, cross from Lé to Yārkand. [*A. O. H.*]

560. **Phylloscopus viridanus** (Blyth). (Pl. XIX.)

This species was common in Hill Yārkand at the Arpalak river in August. [*G. H.*]

One specimen is quite immature, and it is probable that this country is, at least, one of this Tree-warbler's breeding haunts. It is, as already noticed, another of the apparently feeble winged species that seem to cross the Karakoram. [*A. O. H.*]

566. **Reguloides proregulus** (Pallas).

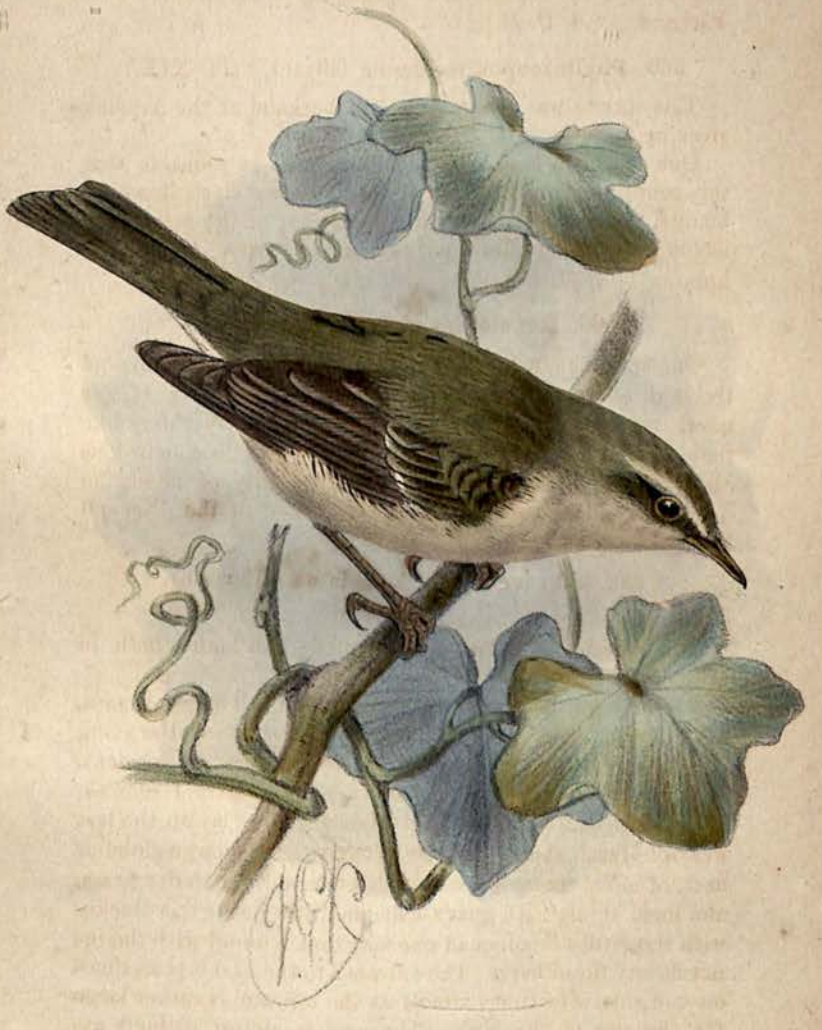
One specimen, a male in bright plumage, was obtained on the 30th of October in the Sind Valley, Kashmir. It was never noticed elsewhere, but in the case of Warblers like these, that have to be waited and looked for, no conclusions can safely be drawn from the impossibility of procuring specimens on a hurried march like that of the Yārkand Expedition. [*G. H.*]

572. **Abrornis xanthoschistus** (Hodgson). (Pl. XX., fig. 1.)

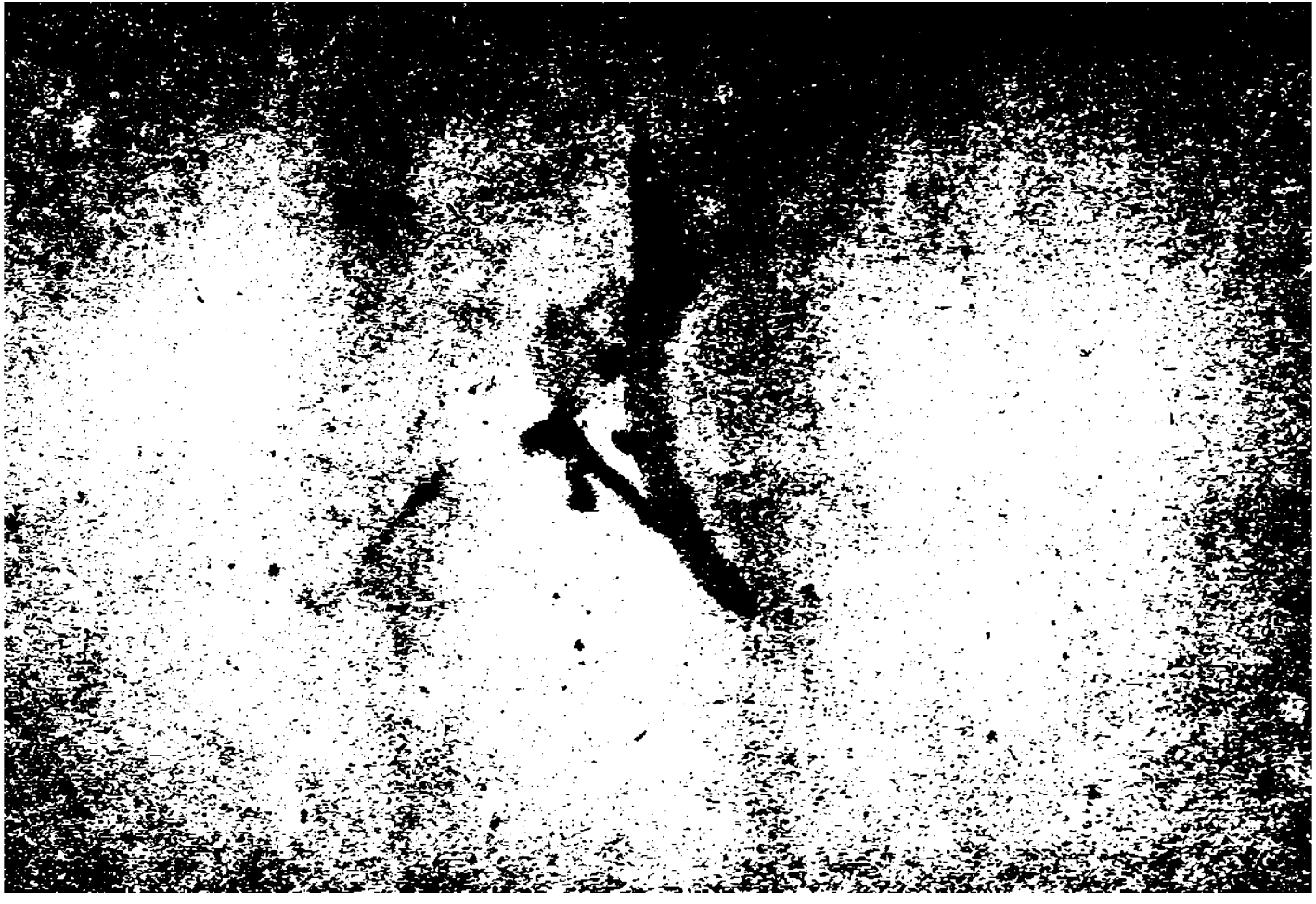
This species was very common in Kashmir, both in May and October. [*G. H.*]

Throughout the Himalayas south of the first snowy ranges, and in all wooded valleys in rear of these, from Darjeling to Murree, this species appears to be a permanent resident.

I have received its nests and eggs from several sources, and have recently taken them myself. They lay in the last week of March, April and May; constructing a large globular nest, of moss, more or less mingled exteriorly with dry grass, and lined thinly with goat's-hair, and then inside this thickly with the softest wool, or in one nest that I found with the inner downy fur of hares. The entrance to the nest is sometimes on one side, sometimes almost at the top, and is rather large for the size of the bird. The nest is almost without exception placed on a grassy bank, at the foot of some small bush, and usually contains four eggs. These latter are pure white, generally very glossy. In texture the shells are very



PHYLLOSCOPUS VIRIDANUS.



1. ABRORNIS XANTHOSCHISTUS.
2. ABRORNIS ALBOSUPERCILIARIS.

fine and compact. The eggs are moderately broad ovals, much pointed towards the small end, and vary from 0·6 to 0·65 in length, and from 0·48 to 0·52 in breadth.

I believe that I correctly identified this species, but am not absolutely certain. It is either this, or *Abrornis albosuperciliaris*, Blyth (Pl. XX., fig. 2), but the descriptions available are not sufficiently detailed to place the matter absolutely beyond doubt, and we figure both species. Mr. Brooks would transpose the names, but I hold that the upper surface of *A. xanthoschistus* is ash grey, while that of *A. albosuperciliaris* is leaden ash, a darker and bluer shade, and have assigned the names accordingly. Both species occur in the same localities, but the latter is much the rarest. The eggs of the two species are undistinguishable, and in the birds I cannot find any constant differences in size; *A. albosuperciliaris*, perhaps averages larger, but Dr. Henderson records the following dimensions of a male *A. xanthoschistus*—equal to those of any *A. albosuperciliaris* that I have yet seen. Length, 4·13, tail from vent 1·5, expanse, 6·5, wings when closed reach to within 0·75 of end of tail. He notes that the legs and feet are light brown, and the bill brown above and yellow beneath. [*A. O. H.*]

583. **Sylvia curruca** (Gm.).

This species was only met with in Yārkand, chiefly at or near the foot of the hills, where it is very abundant, especially in the Tamarisk (*Myricaria* sp.) jungles. [*G. H.*]

As is always the case in this group the males are considerably larger and have even proportionately larger bills than the females; the specimens obtained are nearest to the larger Indian race which has been separated as *S. affinis*, but they are not larger than the European specimens of the Lesser Whitethroat. The wings of the males measure 2·6 — 2·65, whilst the wings of some of the so-called *S. affinis*, measure sometimes as much as 2·8, and those of the lesser Indian race, identified by Dr. Jerdon with the Lesser White-throat of Europe, measure even in the males sometimes as little as 2·35. I am scarcely disposed to consider that *S. affinis* merits specific separation from *S.*

curruca. A larger and a smaller race unquestionably exist, but they occur in the same localities and every intermediate size is met with.

Amongst the specimens were nestling birds procured on the 15th August, right down in the plains of Yârkand, so that the bird probably breeds there in June and July. [*A. O. H.*]

584. **Henicurus maculatus** (Vigors).

This species was only once met with, and that was near Púnch on the road leading down from Kashmir to Lahore. It was alone, moving from place to place amongst the grass, catching flies, and was very tame. [*G. H.*]

Common as it is along the whole of the southern face of the Himalayas, it is seldom met with beyond the first snowy range, and only in river valleys passing through those ranges by wide gaps.

This species breeds in April and May, but rarely at a height of above 4000 feet; I have repeatedly found the nest, but I prefer to any description of my own, a note in regard to nidification of this species, with which my dear old friend Captain Hutton favoured me not long ago.

"The pied Fork-tail frequents the sides of streams and rivulets, flitting from rock to rock and stone to stone with a light and graceful movement which is half flight, half hop. Its habits have obtained for it among the European visitors to the hills, the name of the '*Dhobi-bird*,' or washerman, from its loving to frequent the places to which those worthies likewise resort to destroy our clothing. It selects a retired spot along the margin of some quiet streamlet, and there constructs its curious cup-shaped nest upon the ground among the plants and mosses which there abound. The nest is a deep cup composed exteriorly of fine roots neatly interwoven with horse-hair and green mosses and thickly lined with the gauze-like skeleton leaves of the willows that fringe the margins of the stream; many of these skeleton leaves are likewise interwoven among the external roots. It has a neat and beautiful appearance, in perfect keeping with the trim and dainty plumage of the bird itself."

The eggs are oval in shape, resembling those of the Wagtail, but differing from them in the comparative sparseness and clearness of the markings. The ground colour is generally a pale clear greenish white, and they are thinly spotted, speckled, and even streaked with yellowish or reddish brown. Where several of the spots occur close together a nimbus of the same colour, but paler, more or less unites them, and a few somewhat faint brownish purple spots and clouds, or an indistinct mottling of this colour, are here and there occasionally observable. The eggs vary much in size and shape—some are a good deal elongated and some conspicuously pyriform. They have very little, if any, gloss. In size they vary from 0·9 to 1·03 in length, and from 0·68 to 0·75 in breadth. I do not know why ornithologists in India so generally refused to admit Gould's species, *H. guttatus*, which is really very distinct. It is perhaps a trifle smaller, with the wing decidedly shorter and the tail-feathers narrower, but it is chiefly in plumage that it differs from *H. maculatus*. There is much less white on the forehead; the nape, instead of being, as in *H. maculatus*, white for the breadth of a full inch, the feathers narrowly fringed with black, has only a few of the feathers broadly white centered. The back, instead of being thickly sown with white more or less crescentic marks, is thinly sprinkled with small circular dots, the largest of which are scarcely one-twelfth of an inch in diameter. The black of the breast and lower abdomen comes further down than in *H. maculatus* and is *spotless*, whereas in the latter most of the black feathers of the lower breast are narrowly tipped with white. One before me, from Darjeling, measures—Length, 10; wing, 3·9; bill at front, 0·75; tarsus, 1·1. As a whole it is a somewhat more sombre-looking bird than the more commonly seen western species. [*A. O. H.*]

590. **Motacilla luzoniensis** (Scop).

Specimens in nearly full breeding plumage were obtained on the 13th of August, at the Chu-Chu Pass, twenty-five miles above the plains of Yārkand. It was common on

both sides of the pass along the Arpalak river. Other specimens, some immature, were obtained at Tikshé, near Lé, on the Indus, and also at Kargil, in Ladák. Similar Wagtails (but they may possibly all have belonged to the next species) were observed in many places where there was water, in the plains of Yārkand, and again in Hill Yārkand, at Mallik Sháh, and the Káratág Lake (15,000), on the return journey. [*G. H.*]

591. **Motacilla personata** (Gould).

I believe that this is the species described by Dr. Jerdon as *M. dukhunensis*, Sykes, and have assigned the number accordingly. [*A. O. H.*]

One specimen in full breeding plumage of *M. personata* was obtained at Oi Tográk, in the plains of Yārkand, and others, as well as nestling birds, in August, along the Arpalak river. Generally, wherever there was water throughout Yārkand, similar Wagtails were observed; but many of these probably belonged to the preceding species. [*G. H.*]

There seems little doubt that both birds breed in Yārkand, and that *M. luzoniensis*, at any rate, breeds also in Ladák. [*A. O. H.*]

592. **Calobates sulphurea** (Bechstein).

A single specimen of this graceful little Wagtail was obtained at Kargil, Ladák, on the 23rd of October. [*G. H.*]

I doubt now whether many of this species breed in the Himalayas. A few, I know, breed in Kasmir, but the great majority certainly go further north, probably to Southern Siberia, where Radde found them common, and where they arrive early in May. [*A. O. H.*]

594. **Budytes citreoloides** (Gould).

This species was found throughout Kashmir and Ladák, and was noticed as high as 11,000 feet, at a small lake surrounded by snow on the Zoji-lá Pass. Doubtless the bird breeds in both provinces. The specimens obtained in May, June, and July were all in full breeding plumage; the entire head, neck, and under parts brilliant sulphur yellow; the six central tail feathers and the whole of the

back, scapulars, and lesser coverts, velvet black. A fine male measured seven inches long; wing, 3″·4; bill at front, 0″·58; tarsus, 1″·1; and hind toe and claw, 0·95. [*G. H.*]

The species described by Dr. Jerdon as *Budytes citreola* has now been clearly proved not to be the *B. citreola* of Pallas, the male of which, even in the breeding season, never becomes black on the back, but only has a black cowl behind the yellow head, the rest of the back remaining grey. This is a matter absolutely beyond dispute now, as is shown by Pallas' original description, and the remarks of Middendorf and others. It is quite true that Mons. Verreaux named specimens with the black back as *B. citreola*, and that black-backed specimens often do duty for this species both in English and continental museums; but Mr. Brookes has carefully investigated this question—has obtained specimens from Lake Baikal for comparison, and both he and I have very large series of the two species, both of which are common in the plains of India in the cold season. I have worked out the whole question with him, and there remains no possibility of doubt that the Black-backed Yellow-headed Wagtail is quite distinct from Pallas' *B. citreola*. Independent of the colouring of the back, our bird is considerably larger and has a much longer bill, and the only point that remains to be decided is what name it ought to bear. I considered that it was the *B. aureocapilla* of Vieillot, and in this Mr. Blyth concurred with me; but I was unable to refer to this author's description, and Lord Walden, who has done so, informs us that *B. aureocapilla* is really identical with *B. citreola*. Is the bird, then, *B. calcaratus*, of Hodgson? I do not think so. I subjoin,* for facility of reference, Hodgson's original

* Hodgson's original description in As. Res. vol. xix. p. 190.

"Genus: *Motacilla*, auctorum.

"Sub-genus: *Budytes*, Cuvier.

"Species, new: *calcarata nobis*, closely allied to *M. neglecta*. Obviously distinguishable from the typical Wagtails by the shortness of the tail, the superior height and strength of the tarsi, and the longer, straighter, and extremely acuminated nails, the hind one of which is longer than its toe, and, in our species as nearly *straight* as may be. Seven and three-quarters inches long, whereof the tail is but three and a half,

description, taken from the "Asiatic Researches," a work seldom now to be met with. I suspect some mistake in the dimensions given for the tarsus; but whether these be right or wrong, the description is scarcely applicable to any stage of the present species with which I am acquainted. If the bird is not, as I believe, *B. calcaratus*, it should probably stand as *B. citreoloides*, Gould, and this name I have for the present assigned to it.

One abnormal specimen, a female, which from its size and structure unquestionably, in my opinion, belongs to this same species, was killed near Shâhidulla, on the Karakash River, on the 5th August. The peculiarity of this specimen is that the bright yellow of the head and under parts has been everywhere replaced by slightly dingy white, while the black of the back, &c., is replaced by dingy iron grey. [*A. O. H.*]

597. **Pipastes arboreus** (Bechstein).

Of the Tree Pipit numerous specimens were obtained in the neighbourhood of Sánju and Oi Tográk in the plains of Yârkand. They were found in the fields among cultivation, and were precisely similar to the specimens obtained in the plains of India. [*G. H.*]

All these birds belong to the *P. arboreus* type. Great doubts have existed, which I long shared, as to the specific distinctness of *P. agilis* vel *maculatus* and *P. arboreus;* having recently had the opportunity of re-examining with Mr. Brookes an enormous series, consisting of more than 100 specimens of each form, we came to the conclusion that the two birds are at least easily *separable.*

extending only two inches beyond the tips of the wings. Expanse of wings eleven inches; weight, less than one ounce; bill, $\frac{10}{16}$ of an inch, and equal to head; tarsus, $1\frac{3}{16}$; central toe, $\frac{10}{16}$; hind toe, $\frac{6}{16}$; its claws, $\frac{7}{16}$. Above the flanks, grey slaty; below, bright yellow. A yellow line on each side of the head above the eye from bill to nape. Wings: six central feathers and upper coverts of tail, black; the great coverts of wings and the alar plumes very widely margined below and also tipped with white: the six lateral rectrices much blanched, increasingly to the extremes, which are nearly all white. Legs black, bill horn-grey, iris brown. Female considerably less; six and three-quarters inches long, similar to the male but more dully coloured, and the alar and caudal black plumes of the male, brown in her."

It appeared that in *P. maculatus* the whole upper surface was greener, the tail feathers were edged with greenish, the striations of the back were very narrow and but little conspicuous; the supercilium above the posterior angle of the eyes continued backwards over the ear-coverts was nearly pure white; the abdominal plumage was whiter. In *P. arboreus* the upper surface was brown, the tail feathers were not edged exteriorly with green, but with pale buff; the striations of the back were broad and conspicuous, the supercilium of less extent and buffy throughout, the abdominal region more buffy. Accepting these points of distinction, all the Yārkand birds, without exception, must be referred to *P. arboreus*. I have said that the two forms are easily separable, but it does not, therefore, necessarily follow that they belong to distinct species: it is still, it seems to me, quite possible that *P. maculatus* may be the young bird of *P. arboreus*, and although this involves the supposition that this bird, contrary to the analogy of all similar species, does not assume adult plumage until the second year, there are yet two points which favour the suspicion: the first is, that some summer-killed *P. maculatus* are scarcely distinguishable from *P. arboreus* killed at the same season; the second that I have birds sent from England as *P. arboreus*, and supposed to have been there killed, which, if obtained in India, we should certainly class as *P. maculatus*. Nothing is easier than to separate all specimens obtained during the cold season in the plains, as belonging to one or the other species or race. Some specimens killed early in summer in the hills seem more or less intermediate between the two. If they really are distinct, then I suspect that *P. maculatus* occurs in England as well as *P. arboreus*. It would be interesting if European Ornithologists would see whether they obtain Tree Pipits presenting the distinctive characters above pointed out as pertaining to what we call *P. maculatus* here. [*A. O. H.*]

604. **Agrodroma Jerdoni** (Finch). (Pl. xxi.)

Corydalla griseorufescens. Hume. Ibis, 1870, p. 286.

A specimen of this large Pipit, which is equally common in the plains during the cold season, and the hills during

part, at any rate, of the hot weather, was obtained on the return journey at the foot of the hills leading into Kashmir. [*G. H.*]

Dr. Finch has kindly informed me that the name by which I characterized this species in the "Ibis" must yield precedence to a name conferred by himself, since the latter was read on the 10th June, 1869, and the former, though assigned many months previous to that date, was not published until February, 1870.

This species is said by my collectors to breed high up in the Sutlej valley in April and May, and Mr. Brookes saw the old birds feeding their young in the neighbourhood of Almora in May and June. The eggs that I possess supposed to belong to this species were thus obtained. My kind friend Mr. R. Thompson sent two men, one an experienced shikaree, and the other a stuffer, into Upper Garhwál to procure birds and eggs for me, especially those of the large pheasants. The men returned with numerous skins, but without a single egg of the species they had been directed to search for. They brought with them, however, two nests of eggs which they had found on the ground, along with a skin of one of the parent birds belonging to each nest. The skin pertaining to the nest of larger eggs, which I am about to describe, was that of the present species, the other was that of *Anthus rosaceus*. The men had never been instructed to search for eggs of this kind; they had no earthly object in deceiving; the birds are both very common in the interior where they were, and the shikaree is not likely to have been himself deceived as to the bird really belonging to the eggs he brought. There is, therefore, a pretty fair presumption that these eggs are what they profess to be, but until seen and taken by a reliable European observer doubts must exist, since the eggs are very peculiar. They are moderately broad ovals, slightly compressed towards the small end, and in size, shape, and general colour, might almost, I think, pass for those of the Redwing. The ground colour is a rather pale olive green, or greenish stone colour, and they are *excessively* minutely freckled all over, but most densely towards the large end, with

AGRODROMA JERDONI.

pins'-point specks of what seems to be slightly reddish brown. The frecklings are so excessively fine and minute that unless closely looked into they are not observed, and the ground-colour and freckling viewed from a little distance blend into an apparently uniform greenish stone colour. The eggs have a little, but not much, gloss. They somewhat recall the eggs of *Garrulus lanceolatus*, but are greener, less pointed, and slightly larger. The great size of the eggs and their peculiar coloration prevents my placing that reliance on their authenticity to which the evidence above recorded would seem to entitle them. In length the eggs varied from 1·0 to 1·15, and in breadth from 0·85 to 0·86. The nest contained four eggs, was placed on the ground at the foot of a small bush, and was loosely put together with grass stems. It was found in Garhwál on the 15th April, at an elevation of about 11,000 feet. [*A. O. H.*]

640. **Lophophanes rufonuchalis** (Blyth).

One specimen was obtained on the 20th October at Sonamurgh, Kashmir. [*G. H.*]

There is no question about the identification, but I take this opportunity of noting that Dr. Jerdon's description is not fully applicable to many individuals of the species. In no specimen that I have examined has there been a "rufous tinge" on *either* the back or belly. There is habitually an olivaceous tinge on the back, but no rufous whatsoever. The specimen obtained, measured in the flesh: length, 3″·75; expanse, 8″·5; wing, 3″·0; bill at front, 0″·45; tarsus, 0″·74. [*A. O. H.*]

644. **Parus monticolus,** Vigors.

Was common in Kashmir. [*G. H.*]

In the Himalayas, at any rate, this species lays in April and May, constructing its nest, a loose dense mass of soft downy fur or feathers, in holes in trees, or even occasionally in cavities in old walls. The number of their eggs varies, but I have recently had a nest sent me containing eight, and the full number is never, I believe, less than six. The eggs are moderately broad ovals, sometimes almost perfectly symmetrical, at times slightly pointed towards one end, and

almost entirely devoid of gloss. The ground is white, or occasionally a delicate pinkish white, in some richly and profusely spotted and blotched, in others more or less thickly speckled and spotted with darker or lighter shades, of blood-, brick-, slightly purplish-, or brownish-red, as the case may be. The markings are much denser towards the large end where, in some eggs, they form an imperfect and irregular cap. In size they vary from 0·68 to 0·74 in length, and from 0·5 to 0·50 in breadth. [*A. O. H.*]

645. **Parus cinereus,** Vieillot.

This species was common in Kashmir, and several specimens were obtained there in the Sind Valley, both in June and October. [*G. H.*]

As usual the males obtained were considerably larger than the females. This species extends over the whole of India. Dr. Jerdon is wrong in saying that "it does not occur in Bengal nor to the eastward," as I have several specimens from Cornellah in Tipperah.

In the Himalayas it breeds in April, May, June, and July, in holes in banks, terrace walls of fields, and even outhouses of dwellings. Occasionally it builds *on* a branch of a tree, and my friend Mr. Buck found a nest thus situated on the 19th of June at Gowra. The nest is usually a shapeless mass of downy fur, cattle-hair, and wool, but when on a branch is strengthened exteriorly with moss. The only nest that I have myself seen in such a situation was a pretty large pad of soft moss, about four inches in diameter, with a slight depression on the upper surface, which was everywhere thinly coated with sheep's wool and the fine white silky hair of some animal. I have a large series of eggs from various localities in the Himalayas and Nielgherries. The eggs resemble in their different character those of many of our English Tits, and though I think typically slightly longer, they appear to me to be very close to those of *P. palustris.* In shape they are a broad oval, but somewhat elongated and pointed towards the small end. The ground colour is pinkish white, and round the large end there is a conspicuous, though irregular and imperfect,

zone of red blotches, spots, and streaks. Spots and specks of the same colour, or occasionally of a pale purple, are scantily sprinkled over the rest of the surface of the egg, being most numerous in the neighbourhood of the zone. The eggs have a faint gloss. Some do not exhibit the zone above referred to, but even in these the markings are much most numerous and dense towards the large end. They vary in size from 0·65 to 0·85 in length, and from 0·5 to 0·58 in breadth. As regards the habits and nidification of this species in the Nielgherries I cannot do better than reproduce some remarks by my fair correspondent, Miss Cockburn :—"This is an extremely lively and active bird, suspending itself in all kinds of attitudes, and flitting from spray to spray continually. Surely no poor helpless insect can screen itself from the sharp, piercing eye of this little devourer, who always looks even at the *backs* of leaves, as if he knew by experience that many an unfortunate caterpillar attempted to take refuge there. I have often watched them on the trellises of my window, prying into every corner, and many a *hairy* caterpillar, which I could not see, has been surprised by a peck on its head, and dragged from its hiding-place into the light of day, where it receives many knocks against some thick branch of the jasmine, after which the murderer holds it with his feet, and, commencing at the head, draws out and devours the entrails. He then drops the skin, and, having wiped his beak, proceeds in search of another. They also feed on spiders and any soft-bodied insects, and are clever in shelling peas and eating the contents. The merry notes of this bird enliven woods and gardens, particularly those which sound exceedingly like 'Cheery, cheery, cheery.' Their nests are found in deep holes in earth banks, and sometimes in stone walls. Once a pair took possession of a bamboo in one of our thatched out-houses—the safest place they could have chosen, as no hand could get into the small hole by which they entered. These Tits show great affection and care for their young. While hatching their eggs, if a hand or stick is put into the nest they rise with enlarged throats, and, hissing like a snake, peck at it till it is with-

drawn. On one occasion I told my horse-keeper to put his hand into a hole, into which I had seen one of these birds enter. He did so, but soon drew it out with a scream, saying a 'snake had bit him.' I told him to try again, but with no better success, however; he would not attempt it the third time, so the nest was left with the bold little proprietor, who no doubt rejoiced to find she had succeeded in frightening away the unwelcome intruder. The materials used by these birds for their nests consist of soft hair, downy feathers, and moss, all of which they collect in large quantities. They build in the months of February and March; but I once found a nest of young Indian Grey Tits so late as the 10th of November. They lay six eggs, white with light red spots. On one occasion I saw a nest in a bank by the side of the road; when the young were nearly fledged the road had to be widened, and workmen were employed in cutting down the bank. The poor parent birds appeared to be perfectly aware that their nest would soon be reached, and after trying in vain to persuade the young one (for there was but one) to come out, they pushed it down into the road, but could get it no further, though they did their utmost to take it out of the reach of danger. I placed it among the bushes above the road, when the parents seemed to be immediately conscious of its safety." [*A. O. H.*]

646 (*bis*). **Parus cyanus,*** Pallas.

This beautiful little species was common in August in the Tamarisk jungles on the banks of the Arpalak, within

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* *Parus cyanus.*

Adult male (according to Degland), length 4·9 inches. *Plumage.*—Crown of the head, white tinged with azure; a great white patch on the nape; back, rump, and upper part of the wings, azure. Forehead, sides of the head, and the whole lower surface, pure white with a blue spot on the middle of the abdomen; a dark blue stripe stretching from the beak to the nape passes through the eyes, and further on widens and encircles the head. The greater coverts, dark blue margined with paler blue and tipped with white; the two central tail feathers, azure blue like the back, the lateral tail feathers margined and tipped with white.

Female.—Top of the head ashy white, the blue everywhere less pure;

fifteen miles of the plains of Yārkand. It had apparently been recently breeding, as all the specimens obtained were young birds, one of them being scarcely fully fledged. [*G. H.*]

It is just *possible* that I may not have correctly identified this species, and that the Yārkand birds may, although very closely allied to *P. cyanus*, prove a distinct species. I do not think so, but the only point which makes me doubtful is that Degland and Bree, the latter of whom by the way merely translates the former's description, the only works of reference I have at hand in which the bird is mentioned (for it does not appear to be figured by Temminck and Laugier, as Bree states), both describe the lateral feathers of the tail

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the eye stripe narrower at the nape, and, according to Meyer, no blue spot on the abdomen.

Young birds from Yārkand.—Dimensions, from the dry skin: length 3 inches, wing 2·75, fourth and fifth primaries equal and longest, first primary 1·3 shorter, second primary 0·35 shorter, third primary 0·05 shorter, sixth primary 0·025 shorter. Tail from vent 2·4, central tail feathers exceed external by 0·25. Bill from front, 0·29. Tarsus 0·75.

Description.—Bill, legs, and feet, apparently dusky, the latter inclined to plumbeous in one specimen; crown of the head, cheeks, ear-coverts, and the whole lower surface, white, with, in one specimen, a slaty grey bar on the crown. A broad dusky cyaneous bar on the nape, from which traces of a similarly coloured bar above the ear-coverts and running through the eye are visible. The whole back is of a dusky blue grey colour. Central tail-feathers dull blue, with a speck of white at the tips; lateral tail-feathers, except the exterior ones, white on the outer webs, greyish brown on the inner, and more or less tipped with white; the penultimate ones having the apical one-fourth white. Exterior laterals pure white, except just at the base of the inner web, where they are greyish; quills grey brown on the interior webs; the exterior web of the first primary white, of the second primary dull blue for the first quarter of its length, and white for the terminal three-fourths, of the third primary, dull blue for the basal two-fifths, and white for the terminal three-fifths; the fourth primary has the blue and white in proportions of about three-sevenths and four-sevenths; the fifth primary about half of each, the extent of the white diminishing on each succeeding primary; no white margins to the secondaries, but broad white tips. Tertiaries almost entirely white except the basal halves of the outer webs; wing-coverts dull ashy blue, all the greater ones broadly tipped with white, forming a conspicuous alar bar; lining of wing and the inner margins of the inner primaries and the secondaries towards their bases pure white.

as tipped and margined with white, whereas in the Yārkand birds the whole exterior lateral feather on each side is pure white, excepting just at the base on the inner web. In every other respect the birds correspond. [*A. O. H.*]

652. **Accentor nipalensis,** Hodgson.

One specimen of this comparatively rare bird was obtained ten miles below the Pángong lake on the 10th of October. It measured in the flesh :—length 6″·5 ; expanse 10″·0 ; wing 3″·6 ; bill at front 0″·48 ; and tarsus 1″·0. [*G. H.*]

654. **Accentor strophiatus,** Hodgson.

A young specimen of this species, a male, was obtained at Sháhidulla, on the 20th of September. [*G. H.*]

The whole upper surface is a grey brown, much paler and duller coloured than in the adult. The feathers of the back have faint dusky central streaks. The whole of the long superciliary stripe is a dingy white, whereas in the adult the posterior half of this stripe is bright rufous. The breast is a pale rufous fawn, and the chin, throat, and abdomen, are streakless white. [*A. O. H.*]

656. **Accentor rubeculoides,** Hodgson.

This species (by no means common in collections), was seen in considerable numbers on the return journey, from one march beyond the Pángong Lake right through Ladák. It frequented marshy ground and the banks of streams, hopping about from rock to rock. When wounded these birds hide themselves at once in the crevices between the boulders and are thus often lost. Of a specimen measured in the flesh by me, the length was 6·5 ; the tail from vent 2·5 ; the expanse 10 ; wings 3·1 ; bill at front 0·5 ; tarsus 0·93 ; wings when closed reached to within 1·75 of end of tail. The bill was nearly black, and the legs and feet mahogany coloured. [*G. H.*]

658. **Corvus thibetanus,** Hodgson.

The Tibet Raven accompanied the camp throughout, from its first entry into Ladák right through Yārkand, almost to the city itself, and back again. It was extremely familiar

and bold, and it was impossible to leave anything eatable about which it did not attempt to steal. Even milk-pots it would deliberately upset to obtain a sup of the contents. At the greatest altitudes and through the most absolute deserts at least half-a-dozen accompanied the camp, some doubtless of the very same birds thus travelling the whole way from Lé to the vicinity of the city of Yārkand; when the camp divided about half the ravens went with each party. On first starting in the morning they always accompanied the party to a short distance, and then they returned to the old camping ground, apparently to make sure that nothing eatable had been left behind, and there they might be seen prowling about wisely for an hour or so, again joining the party in the afternoon at the new camp. [*G. H.*]

This species is a larger bird and has a very much stronger and more massive bill than the so-called *C. corax*, so common throughout the plains of the Panjáb, but it appears to me very questionable whether this latter bird does not require specific separation from the English one. I have unfortunately no English specimens with which to compare, but a Greenland specimen labelled *C. littoralis*, though sent from Europe as *C. corax*, is a much larger bird than either the Panjáb or the Tibet Raven, and has a very much more powerful bill and feet than either of the latter. In the Greenland specimen the bill measures 3″·4 at front, straight from forehead to point; while similarly measured, the bills of the Panjáb birds do not exceed 2″·8, and those of the Tibetan birds 3″·18. The height of the two mandibles closed is about 1″·0 in the Panjáb birds, 1″·2 in the Tibetan birds, and 1″·25 in the Greenland specimen. No male of the Panjáb bird out of numbers measured in the flesh exceeded 24″·75 inches in length, no female exceeded 23″·75, and no male weighed more than two pounds five ounces. If the Panjáb bird be considered worthy of specific separation it might appropriately bear the designation of *Corvus Laurencei*, in memory of a late viceroy, so long and intimately connected with the Panjáb.

I note that Dr. Jerdon's dimensions of the Indian Raven must have been taken from European authors and not

Panjáb birds. I have measured fully fifty specimens in the flesh, and none exceeded the dimensions above given. I am disposed to believe *Corvus Laurencei* a good species.

Schlegel, I observe, considers (Mus. P. B. 9 Liv. Coraces p. 12), both *Corvus littoralis* (Holböll) and *Corvus tibetanus* (Hodgson), as well as an host of other supposed species, inseparable from the European Raven. He was obviously not aware that the Panjáb possesses a common permanently resident Raven, of which the bills are very much smaller than the European bird, even according to his measurements. He gives the bill at front of males killed in Central Europe, as 2·95* to 3·13,† whereas, in the Panjáb bird, these dimensions vary from 2·69 as a minimum to 2·82 as a maximum, of twelve fine specimens killed at different seasons in various localities. The wings of the same bird he gives as from 15·57 to 16·92, whereas in the Panjáb bird these dimensions vary from 16·6 to 17·25. So that the Panjáb Raven would appear to have a decidedly shorter bill and a somewhat longer wing.

In the Tibet bird again, the bills vary from 3·05 to 3·18, while the wings vary from 17·25 to 17·65, so that this race appears to have a slightly larger bill and a very decidedly longer wing. Of the Greenland bird, he gives the greatest length of bill as 3·35, but in my specimen it is 3·4.

In our Panjáb bird again as compared with the Tibet Raven, one may say as Schlegel does of his *Corvus japonensis*, that it is "d'une taille beaucoup moins forte" and that "les plumes de la gorge, quoique lanceolées, sont petites et beaucoup moins effilées." As no fixed law can be laid down at present as to what should constitute a species, Schlegel may be perfectly correct in denying specific separation to *C. tibetanus* and *C. littoralis*, but if *C. japonensis* is to stand I do not think that *C. Laurencei* ought to be suppressed. [*A. O. H.*]

* In this and all other cases in which I quote Schlegel's measurements, I have converted his French inches and lines into English inches and decimals.

† Macgillivray gives the bills of two males as 3 inches.

661. **Corvus intermedius,** Adams.

Several specimens were obtained in Kashmir, Ladák, and Yārkand. It was common everywhere except in deserts, and as noisy but not nearly so impudent in the neighbourhood of the City of Yārkand, as *C. splendens* is with us. [*G. H.*]

All the specimens are identical with each other, and with examples from Simla, Massuri, Nyne Thál and Darjeeling. I consider this black Himalayan Crow, now always known under Adams' name of *C. intermedius*, a somewhat doubtful species. From Singapore to Simla (and as it is now proved, to Yārkand), the same type of Crow prevails; but as you get further north, until you near the Himalayas, so does the bird slightly diminish in size, and the bill become slightly feebler and less bowed on the culmen. Dr. Jerdon knew nothing of this supposed species, *C. intermedius*, when he quoted Adams to the effect that it was no larger than *C. splendens*. I have measured a score or more in different parts of the Himalayas, and instead of its not being larger than *C. splendens*, I find that it varies in length from 18·0 to 21·0; in wing, from 11·5 to 12·6; in expanse, from 34·5 to 39; in tail, from 7 to 85; in tarsus, from 1·9 to 2·2; in bill (measured straight from forehead to point), from 2·0 to 2·4. All these dimensions (the biggest being males, the smallest females) are from specimens killed at heights of 7000 feet and upwards. Now these dimensions are precisely those of *Corvus culminatus* killed in Oudh and the N.W. Provinces; and many of these appear to me absolutely inseparable from the Hill birds, though some undoubtedly have the culmen slightly more raised. As one proceeds further south the birds become larger, and the culmen is more raised.

The wedge-like character of the tail in *C. intermedius* is insisted on, but in a carefully measured series of this latter killed at Simla at 7500 feet, and forty-six miles from the plains, I found that the longest exceeded the shortest tail-feathers by from 0·8 to 1·4, while in an equally carefully measured series procured at Mullanee in Oudh, some thirty

miles E.N.E. of Cawnpore, I find that the difference was from 0·7 to 1·2.

It is doubtless possible to select types of each form which differ sufficiently to warrant specific separation, did intermediate forms not occur, and the great bulk of the more southern birds *do* appear somewhat different from the Himalayan; but my present impression is that between the most typical *C. culminatus* and *C. intermedius*,* no single intermediate link will be found wanting, and after examining a vast number of specimens from various localities north and south, I am very doubtful of the propriety of retaining *C. intermedius*, as a distinct species. The only matters that make me hesitate to disallow *C. intermedius* altogether, are first, a certain perceptible (though not so to all ears) difference in the caw. Second, a peculiar habit *C. intermedius* has of assembling in parties chiefly in the afternoons, and wheeling and circling round and round high up in the air, in a manner which I have never observed in *C. culminatus*.

As for the eggs they are identical, ten of *C. culminatus* vary from 1·5 to 1·95 in length, and from 1·13 to 1·25 in breadth, while 17 of *C. intermedius*, vary from 1·56 to 1·91 in length, and from 1·12 to 1·22 in breadth. Crania and sterna are perfectly similar.

The young birds in both supposed species, have the bills of course much less robust than the old ones, and both when freshly moulted have the plumage more brilliant and glossy. The tertials of *C. intermedius* are by no means *always* mucronate, and this supposed peculiarity is equally observable in the tertials of some specimens of *C. culminatus*.

* Schlegel unites *C. intermedius* with *C. culminatus*, but doubtfully, this being one of the species of which he remarks that, owing to the scanty descriptions given of them, "on ne sait que faire," but I notice that he has no typical *C. culminatus* in the museum; the specimen from the Himalayas is of course the so-called *C. intermedius*. But what are his Ceylon birds, with wings 10·75 as a maximum? I have *C. culminatus* from all parts of India, and the very smallest, quite an exceptional bird, has the wing 11·3; surely Schlegel's birds must be what we are accustomed to call the melanoid race of *C. splendens*.

It is just *possible* that on the whole, a large series of *C. intermedius* may be somewhat greener, and one of *C. culminatus* somewhat more purple; but as I said before, I find great difficulty in separating the two supposed species, and see no better reason for naming the birds obtained by the Expedition *C. intermedius* in preference to *C. culminatus*, than that they were obtained in and north of the hills and not in the plains. Take the tickets off, and the most practised ornithologist will find in a series partly killed in Ladák, and partly in Jhānsi, several specimens, which he will not know to which locality to assign, and others which he will certainly assign to the wrong locality. [*A. O. H.*]

665. **Colæus monedula** (Linn.)

The Jackdaw was found very common almost everywhere in Kashmir, where it lives in the villages, and makes its nest under the eaves of the houses and in old buildings. [*G. H.*]

It visits the north west-districts of the Panjáb in large numbers in the cold weather, but it does not breed in the plains. It is not distinguishable in any way from specimens received from Europe. [*A. O. H.*]

667. **Nucifraga multipunctata,** Gould.

This species was common in the valley of Kashmir in October; it was met with at Sānamarg, below Bāltal, and as low as Gond. It was always seen in pairs, feeding on the seeds of the *Pinus longifolia*. It has a harsh grating, discordant cry, something like that of the Roller. It was not at all wild, but kept so high up in the lofty pine trees that it was not easy to procure specimens. [*G. H.*]

Dr. Jerdon gives this as *N. multimaculata*, but Gould's name appears to be really *multipunctata*. The general colour is said by Dr. Jerdon, quoting I think from Gould, to be chocolate brown, but in fine specimens when freshly killed, it is almost pure black. The sexes differ little in size. Dr. Henderson's measurements recorded in the flesh, are:—length 14·25 to 14·5, tail from vent 6·5, expanse 22·5 to 23, wing

8 to 8·5, wings when closed reach to within two inches of end of tail. Bill, legs and feet, black, irides brown. [*A. O. H.*]

668 (*bis*). **Pica bactriana,*** Bonap.

The Afghan or White-rumped Himalayan Magpie was first met with at Drās, soon after crossing the Zoji-lá Pass, into Ladák. All through this latter province, it was common about every village until the Pángong lake was neared. A similar Magpie, believed to be the same, but of which unfortunately no specimens were procured, was observed at

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* *Pica bactriana*. Bonap.

Dimensions of males (obtained by the Expedition).—Length 19·75 to 21; tail from vent, 12 to 13·25; expanse 24·75 to 25·5; wing 8·3 to 8·75; foot, greatest length 2·5, greatest width 1·75; tarsus 1·9; bill at front, straight from forehead to point, 1·4; wings when closed fall short of end of tail by from 7·5 to 8·75.

Description.—Bill, legs, and feet black. Head, neck, back, breast, upper and lower tail coverts, winglets, and axillaries, velvety black slightly glossed with green on the back and blue on the breast. Shafts of the feathers of the throat, spiny and albescent, giving a finely streaked appearance to the throat. Lesser coverts, except at the carpal joint, scapulars, rump, abdomen, sides, vent, and the whole of the inner webs of the primaries (except the extreme tips, and a narrow margin on the inner edge towards the tips), pure white. I may mention that in the perfect fully developed wing in this species the fifth quill is generally longest. In the male the fourth is 0·1 shorter, the third is 0·45, the second 1·6, and the first (which is attenuated and falciform) is 1·4 shorter than the fifth, the sixth is a trifle shorter than the fourth. In the first and second the white of the inner web extends quite to the tip; in the third, fourth, and fifth to within from 0·23 to 0·3 of the tip; in the sixth, seventh, and eighth to within from 0·35 to 0·45; and in the ninth and tenth to within 0·25. This white is only visible on the eighth and ninth quills when the wing is closed, and then only as a narrow line, and not even this in some specimens. The longest tail-feathers exceed the others by 7, 6, 5, 4, and 2·5 inches respectively, in a fine perfect tail. The inner webs of all the lateral tail feathers, except towards the tips, are glossless black. The outer webs of the laterals and both webs of the central feathers, except the terminal 1·5 to 2 inches, are brilliant metallic green, somewhat darker but scarcely less resplendent than the speculum of the male Mallard (*Anas boschas*). To this succeeds a cuneiform band (the apex pointing towards the rump), which beginning in golden green shades into bright purple and then into deep blue, beyond which the rest of the tip is a bluish green with, like the rest of the tail, the richest metallic lustre.

Some of the lesser coverts at the carpal joint are black, glossed with green. The median and greater primary coverts, and the outer webs and

Sáuju, where the road emerges from the hills into the plains of Yārkand, both in going and returning—viz., on the 16th August, and the 12th September. No Magpie was seen elsewhere in Yārkand. Early in July, when the expedition passed through Ladák, the young birds were just able to fly and several were caught. In Ladák this species appears to bear the title of *Hashambri*. [*G. H.*]

Schlegel (Mus. Pays Bas, 9me Liv. Coraces, p. 39) maintains, that this species, *Pica bactriana*, as also *Pica bottanensis*, Delessert, and other eastern species, are inseparable from the European Magpie (*Pica caudata*, Ray, *Pica varia*, Gessner). As to the distinctness of *Pica bactriana*, I am by no means certain; I require a larger series of European birds for comparison, but as to *P. bottanensis* (which, I believe, is the correct name), there can I think be no mistake, the pure black rump forming a constant distinguishing feature,—I doubt whether Schlegel really knows the birds which we identify as *P. bottanensis*. His supposed specimen was obtained by Major Hay, in Tibet, and unless I am mistaken, true *P. bottanensis* does not occur at all in the country traversed by Hay. Dr. Jerdon probably led Schlegel wrong, by saying "Adams states that this bird (*P. bottanensis*) inhabits the wildest parts of Ladakh," while as matter of fact only *P. bactriana* ever occurs in Ladák, *P. bottanensis* is never seen there, and Adams was perfectly correct in believing that the bird he got in Ladák, was identical with *P. bactriana*.

If Schlegel is not under a mistake as to the identity of *P. bottanensis*, how is it that he admits *P. mauritana?* Both species are equally distinct from the common European form.

Of the European bird, Schlegel gives the tail as measuring

tips of all but the first three primaries are a metallic bluish green. The outer webs of the first three primaries are dusky or black, more or less glossed with the same colour as their neighbours. The inner webs of the secondaries and tertiaries, except quite the hindermost of the latter, are black. The outer webs of secondaries and tertiaries, and the inner webs of the hindermost of the latter are metallic blue, more or less glossed with green, all the earlier secondaries with a conspicuous stripe of golden green just inside their margins for the basal two-thirds of their length. [*A. O. H.*]

from 7·08 to 7·85, the wing from 8·12 to 9·72, the bill at from 1·17 to 1·5, tarsus at from 1·75 to 1·96. Macgillivray gives the length of the male 18, extent 24, wing 7·75, tail 10, bill 1·4, tarsus 1·92.

Compare these dimensions with those of *P. bactriana* given below, and I think it will be conceded that this latter species has a much longer tail. Schlegel indeed gives the tail of his "*P. bottanensis*," which as I have already remarked is doubtless *P. bactriana*, as 11·65, but this, if really *P. bactriana* must either have been a female or have an imperfectly developed tail, as in one male that I possess, this measures 14, and I have seen no specimen with a really perfect tail, in which this fell short of twelve inches. [*A. O. H.*]

669 **Garrulus bispecularis,** Vigors.

A couple of specimens were obtained on the road to Kashmir on each side of the snowy pass; it was not noticed elsewhere. A male, measured:—expanse 19·5, legs and feet flesh colour, bill black, irides dark brown. [*G. H.*]

672. **Urocissa flavirostris,** Blyth.

This species is very abundant throughout the Kashmir valley, at the foot of the Hills; it was met with at Bauihál, and again near Bāramulla and Uri. I have recorded on the ticket of a fine male, the following measurements: length, 24; tail from vent, 19; expanse, 22; wings when closed reach to within 16 of end of tail. [*G. H.*]

I do not consider that Gould's species *U. cucullata* can stand, as specimens are to be obtained throughout the Himalayas, from Darjeeling to Murree, presenting the characteristics of both supposed species, as well as all possible intermediate forms.

This bird breeds in April, May, and June, mostly however laying in May. The nest, which is rather coarse and large, made of sticks and lined with fine grass, or grass roots, is so far as my experience goes commonly placed in a fork near the top of some densely foliaged tree. Captain Cock remarks, *in epist.*, "*U. flavirostris* is common at Dharmsál, but the nest is rather difficult to find. I have

only taken six in three years. It is usually placed amongst the branches of the Hill Oak, where it has been polled and the thickly growing shoots afford a good cover, but sometimes it is on the top of a small slender sapling. The nest is a good-sized structure of sticks with a rather deep cup lined with dried roots, in fact it is very much like the nest of *Garrulus lanceolotus*, only larger and much deeper. They generally lay four eggs, which differ much in colour and markings." I think five is the full number, as no less than three nests were taken a few days ago at Kotegurh each containing this number. The eggs are of the ordinary Indian Magpie type, somewhat smaller than those of *U. occipitalis*, but larger than the average of eggs of either *Dendrocitta rufa*, or *D. himalayana*. Doubtless all kinds of varieties occur, as the eggs of this family are very variable, but I have only seen two types; in the one the ground is a pale dingy yellowish stone-colour profusely streaked, blotched and mottled with a somewhat pale brown, more or less olivaceous in some eggs, the markings even in this type being generally densest towards the large end where they form an irregular mottled cap. In the other type the ground is a very pale greenish drab colour; there is a dense confluent, raw-sienna coloured zone round the large end, and only a few spots and specks of the same colour scattered about the rest of the egg. All kinds of intermediate varieties occur. The texture of the shell is fine and compact, and the eggs are mostly more or less glossy. They vary in length from 1·27 to 1·45, and from 0·88 to 0·96, in breadth; but average about 1·32 by 0·9. [*A. O. H.*]

679. **Fregilus graculus,** Linn..

I am not prepared at present to separate the Himalayan and the European Chough. I have examined a vast number of the former, but only two of the latter, and I am therefore perhaps not in a position to speak authoritatively on the subject, but so far as my comparison has gone the birds seem identical; this species is one which varies very greatly in size and length of bill according to sex and age. [*A. O. H.*]

The Chough was very common all the way from the

Sind valley, through Ladák, to near the Pángong Lake; Red-billed Choughs, doubtless this same species, (no specimen was obtained), were common on the Karakāsh. On the upward journey through Ladák, they were usually seen feeding, morning and evening, in larger or smaller flocks in cultivated ground; in October, on the return journey they were feeding in enormous flocks on the berry of the *Hippophae rhamnoides*. This bird was known in Ladák, as the *Chunka*. A young bird of this species had the legs and feet blackish red, the bill nearly black above and dark orange on the lower mandible. [*G. H.*]

679 (*bis*). **Podoces Hendersoni,** Hume. (Pl. xxii.)

This species was found in the desert ground after leaving Sānju, *en route* to Koshtak, and also near Oi-Togrāk. They always kept in pairs, and moved about from one sand-hill to another, seemingly searching for insects in the sand. The stomachs, however, were filled with grain, picked out of the horse-dung, found in the road.

They habitually fluttered and flapped about in the sand, laving their feathers in it after the manner of fowls, or like some of our Babblers (*Malacocerci*), commonly called in India "Dust-birds." The Turki name "Kum-tuché" is said to mean "sand bird." There was hardly a trace of vegetation in the localities in which they occurred, and they were always seen on bare hillocks of drift sand. They were met with on several occasions, and always in similar localities. Mr. Shaw, who had seen them on his previous journey to Yārkand, said that they were good eating. [*G. H.*]

In its external form this bird unquestionably most nearly resembles the Choughs. Of its internal structure we have at present no materials for judging. Following Bonaparte, I have placed this genus with the Choughs, and not with the Jays or Magpies; but I cannot avoid the suspicion that these birds may constitute a very aberrant form of the great Timaline group.

PODOCES HENDERSONI.

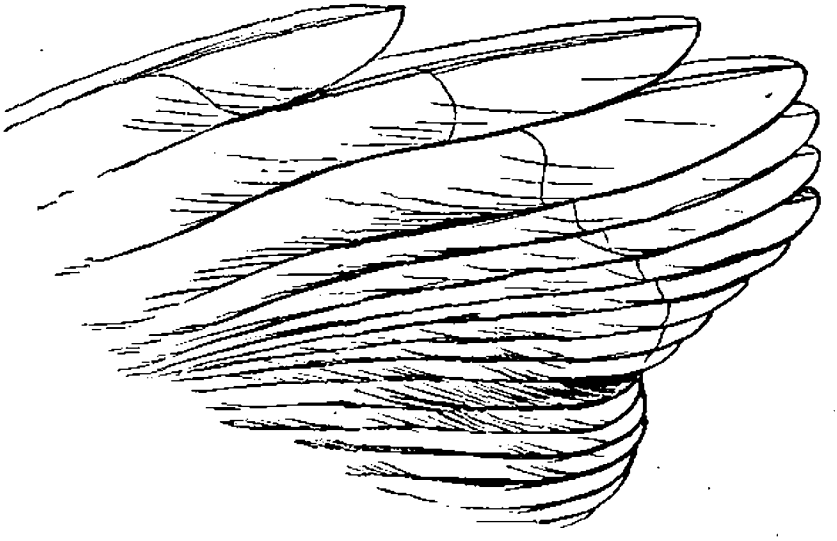
DIMENSIONS of two males—one shot near Sānju, the other at Oi-Tograk:

Length	11·5	...	...	11·5
Tail from vent	4·5	...	...	4·
Expanse	18·	...	...	17·75
Which primary longest ...	3rd, 4th, 5th, sub-equal		...	imperfect
By how much other primaries fall short of longest ...	1st by 1·75 2nd 0·5 6th 0·05 ·3		...	imperfect
Bill straight from forehead to point	1·56	...	...	1·45
Covered by frontal plumes for	0·35	...	...	0·23
Bill from gape	1·75	...	...	1·73
Tarsus	1·65	...	...	1·6
Mid-toe to root of claw ...	0·77	...	...	0·75
Its claw straight from root to point ...	0·42	...	...	0·45
Inner toe	0·63	...	...	0·62
Its claw	0·36	...	...	0·3
Outer toe	0·6	...	...	0·59
Its claw	0·3	...	...	0·35
Hind toe	0·45	...	...	0·35
Its claw	0·5	...	...	0·45

DESCRIPTION.—The bill, legs, and feet are black. The tail quills (except a white bar), the greater coverts, and the whole top of the head and nape, black, with a metallic purplish blue lustre; most of the feathers of the head with a minute rufescent white speck at the tip. All the primaries with a very broad white bar extending from near the base to near the tip, and, except on the first primary, occupying the outer as well as the inner web. The shafts of the white portion of the feather are, in the first two or three primaries, partly brownish; in the rest, white. The whole of the rest of the bird may perhaps be best described as a pale Jay colour, that is to say, a mixture of pale rufous and fulvous fawn; with, especially on the back and rump, a vinaceous tinge, and becoming albescent on the chin, cheeks, and lower tail-coverts. The upper tail-coverts are very long, and reach to within an inch from the end of the tail, and are coloured in one specimen like the back and

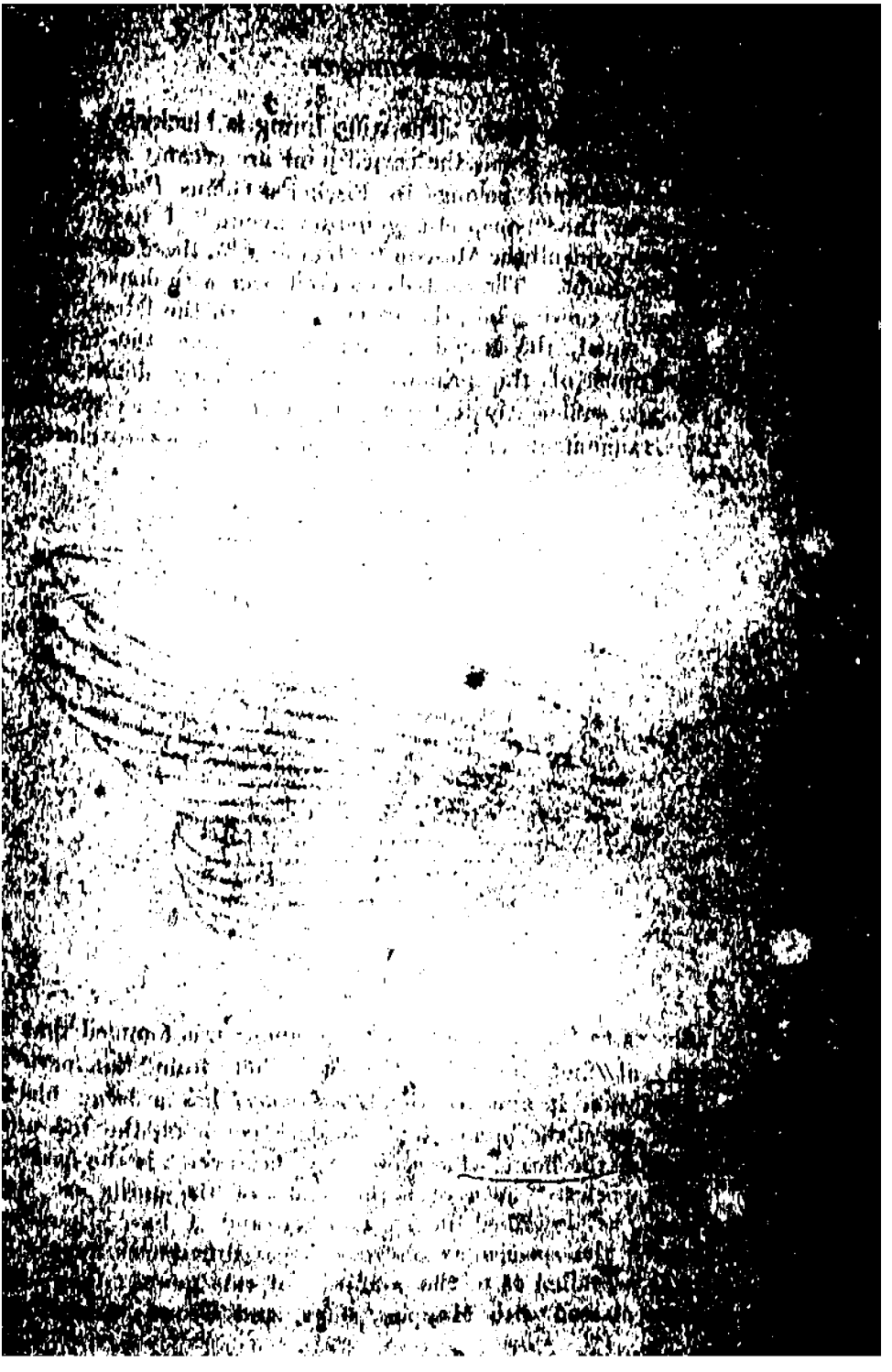
in the other are paler. The wing lining is blackish brown, but the feathers about the carpal joint are creamy white.

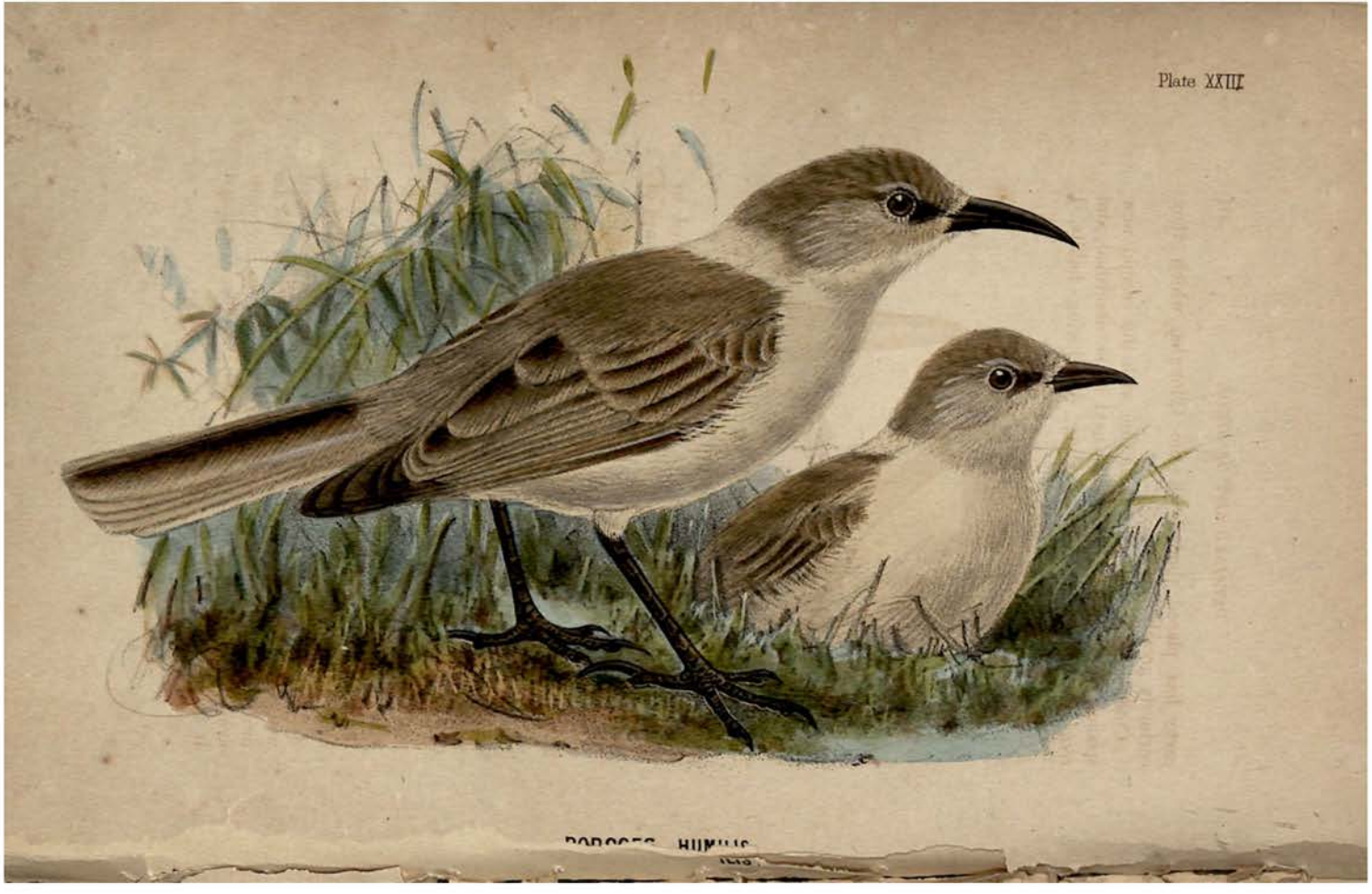
That this bird belongs to Fischer's Genus *Podoces*, as defined in the "conspectus generum avium" I have been unable to consult the Moscow "Mémoires"), there can be no possible doubt. The nostrils covered over with dense tufts, the gently curving bill, the strong feet, with the lateral toes nearly equal, the rounded wing maintaining the typical proportions of the primaries, and the long dense soft plumage, sufficiently testify to this fact. Even as regards the arrangements of colours, the present species so closely



Podoces Hendersoni.

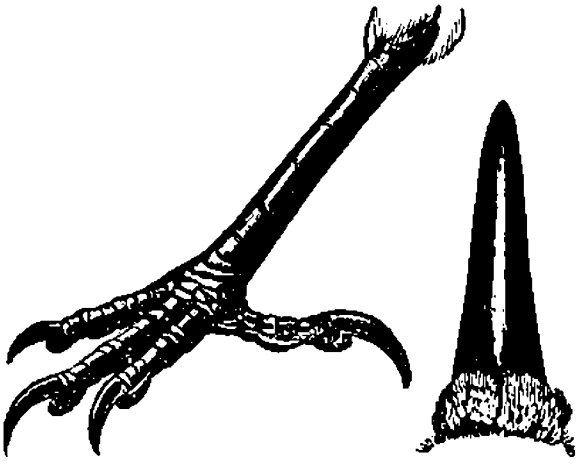
adheres to the bird on which the genus was founded that I had at first identified the two; but from Bonaparte's description it appears that *P. Panderi* has a large black patch upon the breast, and no black patch on the top and back of the head, whereas exactly the reverse is the case in this species. Moreover the shafts of the quills are not black, as described in *P. Panderi*, and I have therefore named the species as above. Great differences appear to have prevailed as to the affinities of this genus: they have been classed with Magpies, Jays, and Crows; and Bona-





parte has placed them with the Choughs, which they certainly greatly resemble.

Considered, however, in connexion with the second new species of this genus, which has next to be described, and remembering their ground feeding, dust-loving habits, I



Podoces Hendersoni.

confess that, as already noticed, I should be inclined to suspect affinities with some of the more aberrant groups of the *Timalinæ*. [*A. O. H.*]

679 (*ter*). **Podoces humilis,** Hume. (Pl. xxiii.)

This strange bird was only seen above Kitchik-Yílák, on the way to Yārkand; on the return journey it was not met with. It frequents short grassy downs, at a height of about 1100 feet. They were not in flocks, but were scattered all over the hill side. [*G. H.*]

Although differing in habits, appearance, and size so widely from the preceding, it seems impossible to separate it generically. The same curved, sub-cylindrical elongated bill; the same dense nareal tufts; the same robust feet, with the lateral toes nearly equal; and the same shaped wings, characterize both species. It may possibly not be new to science, but I can find no record of it in any work available to me for reference, and I have therefore designated it as above.

DIMENSIONS (*from the dry skin*) :—

	Male.		Female.		Male.
Length	7·5	...	7·	...	7·3
Tail	2·8	...	2·4	...	—
Wing	3·75	...	3·55	...	3·75
Which primaries are longest		3rd, 4th, and 5th		3rd, 4th, and 5th	
1st primary falls short of longest	1·55	...	1·3	...	1·35
2nd ditto ditto ditto	0·25	...	0·2	...	0·25
6th ditto ditto ditto	—	...	0·1	...	0·05
7th ditto ditto ditto	—	...	0·2	...	0·17
Bill at front	0·97	...	0·75	...	1·
Bill from gape	1·02	...	0·78	...	1·05
Tarsus	1·25	...	1·3	...	1·5
Mid-toe to root of claw ...	0·63	...	0·7	...	0·67
Its claw straight from point	0·39	...	0·35	...	0·39
Inner toe	0·4	...	—	...	—
Its claw straight from point	0·3	...	—	...	—
Outer toe	0·45	...	—	...	—
Its claw	0·30	...	—	...	—
Third toe	0·45	...	0·43	...	0·4
Its claw	0·45	...	0·42	...	0·45

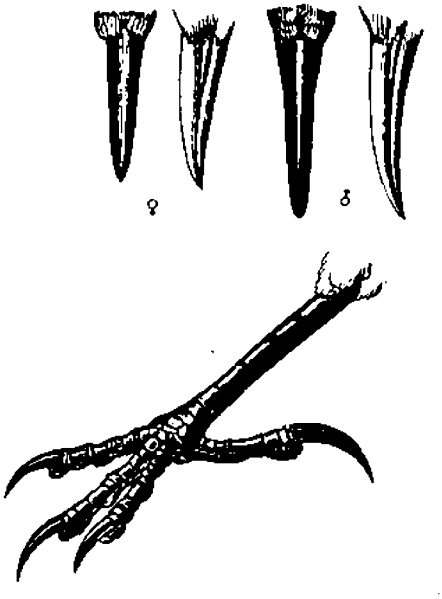
DESCRIPTION.—The bill, legs, and feet are black. The forehead, lores, and an indistinct streak over the fore part of the eye, fulvous white. A dusky line through the lores

Podoces humilis.

to the eye. Front, top, and back of the head, back, scapulars, and rump, a dull earthy brown, very faintly rufescent on the head; a broad yellowish white patch upon the nape. The four central tail feathers, blackish brown, tipped and margined paler; lateral tail feathers white, tipped and margined on exterior webs with dingy fulvous. Wings brown, the quills

slightly darker brown, narrowly margined and tipped with paler brown. Chin, cheeks, and ear-coverts, and entire lower parts, dingy fulvous white. The ear-coverts slightly more tinged with fulvous or pale fulvous brown, and silky.

The female has more of a rufescent tinge on the back and scapulars than the male, and has the quills a darker hair-brown, the tertiaries and some of the secondaries more distinctly margined with a pale rufescent brown. In both sexes the bastard wing appears to be a dark hair-brown.



Podoces humilis.

It will be noticed that the female is smaller in most of her dimensions, and has the bill conspicuously shorter. [*A. O. H.*]

680. **Pyrrhocorax alpinus,** Vieillot.

The Alpine Chough was seen occasionally in the same localities as the common one in the Sind valley and Ladák, but was much less plentiful. Near Shérgul, however, in November, it was seen in immense flocks, but so wild as to be unapproachable. Like the common Chough, the yellow-billed species was seen either feeding in cultivated lands or else on the berries of the *Hippophae rhamnoides*. [*G. H.*]

681. **Sturnus vulgaris**, Linn.

This species, though not observed in Kashmir or Ladák, was very common in Yārkand. [*G. H.*]

The specimens exhibit for the most part the slightly longer bill which has induced some ornithologists to separate the Indian from the European race. But a comparison of a large series of both does not incline me to support this separation. Several of the birds obtained in Yārkand in the latter half of August were birds of the year, in the immature plumage, and others were in a transitional stage, having assumed more or less of the glossy purple white-tipped plumage. [*A. O. H.*]

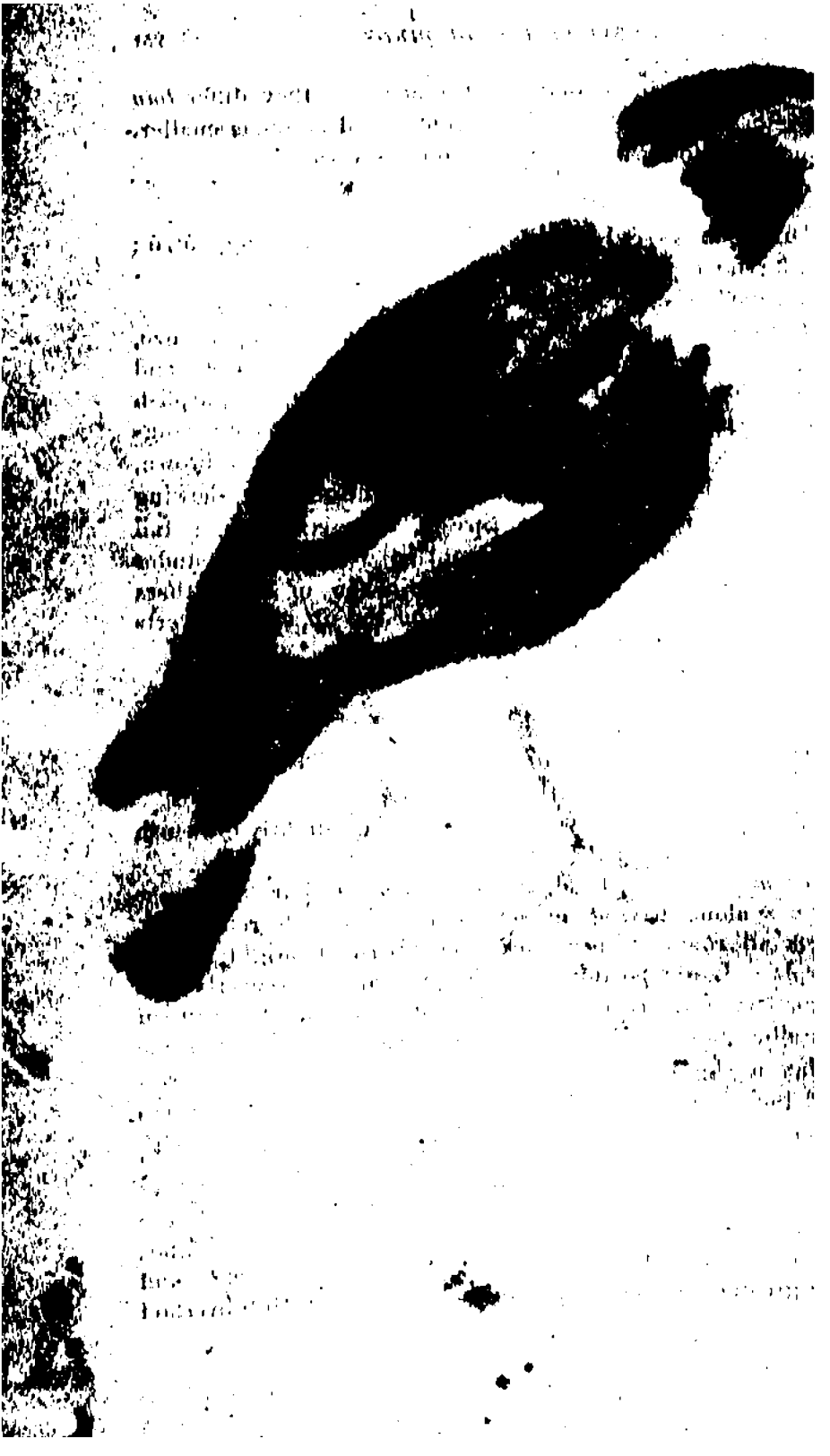
682 (*bis*). **Sturnus nitens**, Hume. (Pl. xxiv.)

This species was abundant about Srīnagar, and the Kashmir valley generally, in May and June. [*G. H.*]

It appears to be the species that has hitherto been identified with *S. unicolor* of Southern Europe, but it differs most markedly in its brighter tints and smaller size from the only European examples of this species with which I have had an opportunity of comparing it. It is this species which is not uncommon in the Peshāwer valley, and which breeds in May in the holes of trees in the compounds of the cantonments. It is equally common, I believe, in Kashmir and Afghanistan. Compared with the European bird, the bills are less compressed towards the tips, and looked at from above seem more spatulate towards the end. The birds are slighter and smaller, the wings ranging from 4·6 to 4·9 inches, against 5·2 in the only European specimens I have to compare it with, and the total length being from 7·25 to 8·0, against 9·0 inches in the Sardinian Starling. The colours are brighter (recalling the coloration of *Juida*) and the plumage more glossy, while the breast hackles are narrower and shorter.

Learning that Gould had figured a new eastern Starling under the name of *S. purpurascens*, I concluded that this must be my *S. nitens*, but having at last had an opportunity of consulting his twenty-second part of the "Birds of Asia,"

STURNUS NITENS.



I see that both in plumage and dimensions they differ *toto cœlo*—*S. nitens* is absolutely speckless, and is much smaller. I quote the following from Mr. Gould's work :—

Sturnus purpurascens.

DIMENSIONS.—"Length, 8·5; bill, 1·25; wing, 5·75; tail, 3; tarse, 1·12."

DESCRIPTION.—"Bill yellow; feet reddish brown.

Plumage.—"Face, head, throat, and neck deep bronze, passing into green on the upper part of the back and breast; lower portion of back and upper tail coverts purplish blue; abdomen dusky brown with a bronzy lustre; wing-coverts deep coppery or bronzy red; wings greyish brown, each feather bordered by a velvet-like line of black, showing very conspicuously on the tips of the secondaries: tail similar, but the velvet edging not so well defined; under tail-coverts black, tipped with white, a few of the feathers on the upper part of the back and on the upper tail-coverts with a spot of white at the tip."

Compare with the above :—

Sturnus nitens, nobis.

DIMENSIONS.—Length, 7·75 to 8; bill, 0·95; wing, 4·6 to 4·9; tail, 2·6; tarse, 1·1.

DESCRIPTION.—Bill yellow; feet dull, or slightly brownish red.

Plumage.—Face, head, throat, a deep *blue* purple, the ear coverts alone having in some lights greenish reflections. Neck all round, upper back and breast a bright ruddy purple. Lower portion of back, and upper tail-coverts with a coppery and green gloss. Abdomen black, with a green metallic gloss. Wing-coverts dark green, with, in some lights a slight golden tinge. Wings, with the primaries and their greater coverts and the earlier secondaries towards their bases very narrowly, but very distinctly, edged with white. Quills greyish brown, outer webs of primaries inside the white edging black, with a narrow band of the same colour at the tip; secondaries and tertiaries similar, but only about the outer half of the outer web black, and the greater portion of this, in fact all but the tips, overlaid

with metallic green, the black band at the tips more conspicuous than in the primaries. Under tail-coverts black, with a faint purple and green gloss. The whole bird absolutely spotless.

I think no one can well doubt that *S. nitens* and *S. purpurascens* are distinct. From *S. vulgaris*, as well as the Indian race of this latter, no one again can well question the distinctness of my new Starling. As to *S. unicolor*, the only specimen I possess, besides being much larger, having a more compressed bill, much longer breast hackles, larger feet and stronger claws, altogether lacks the brilliant contrasts of colours so conspicuous in *S. nitens*. My specimens might have been faded, but there is no indication of these contrasts in La Marmora's original description, or in Degland and Gerbe. I really think this is a good species. I have seen at least fifty specimens of it, all identical, but if there does not happen to be one in the Leiden Museum, we cannot of course expect Prof. Schlegel to admit its distinctness. [*A. O. H.*]

684. **Acridotheres tristis,** Linn.

This species was plentiful in Kashmir, and was observed ten miles beyond Srīnagar, after which it was not again met with till the expedition returned to the same localities. [*G. H.*]

706. **Passer indicus,** Jard. and Selby.

This species was common in Kashmir and Ladák, but was never met with in Yārkand. [*G. H.*]

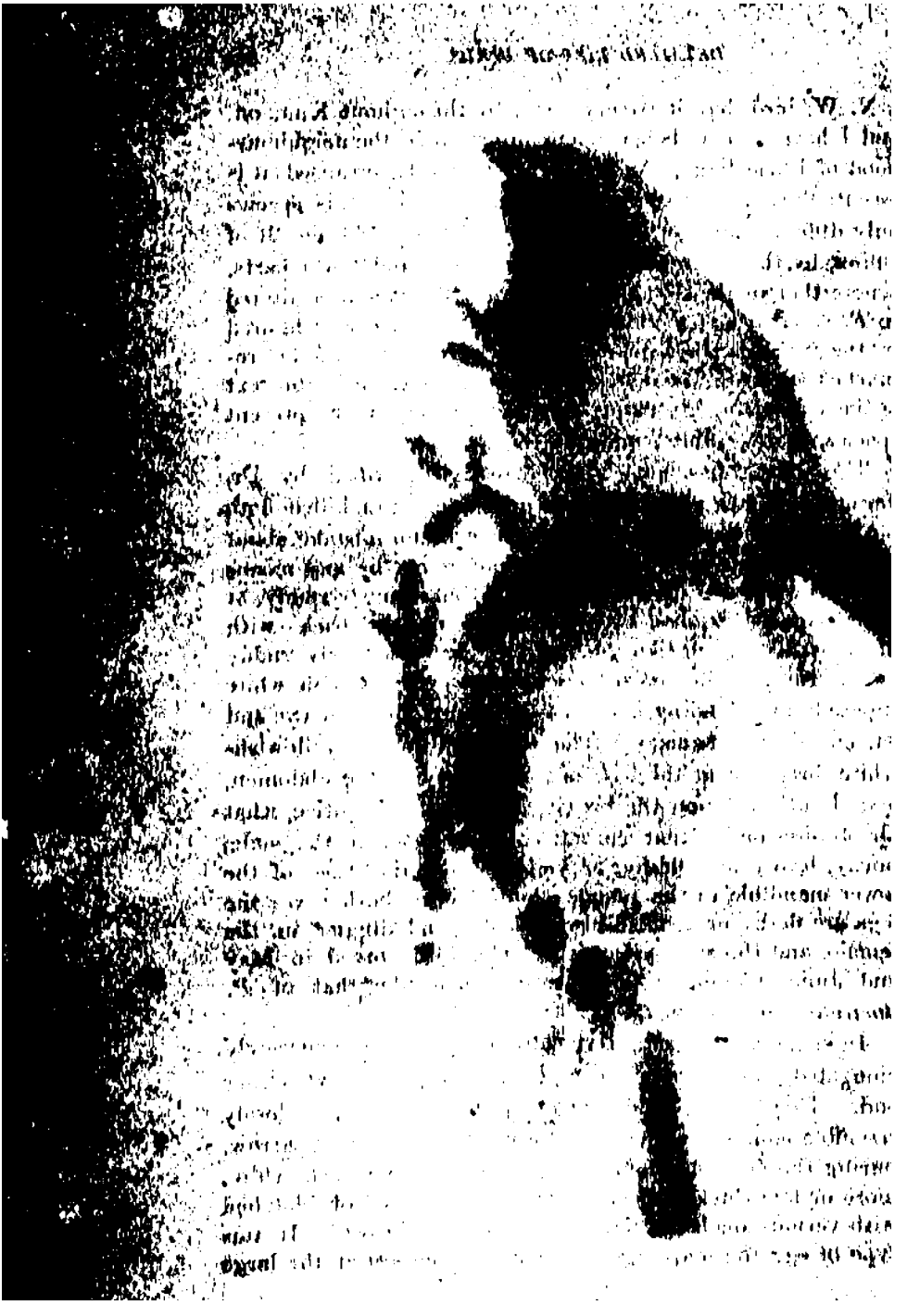
If the few English specimens that I possess fairly represent the European sparrow, I entertain no doubts of the distinctness of the Indian bird. The latter is altogether a cleaner, brighter coloured, and smaller bird. [*A. O. H.*]

708. **Passer cinnamomeus,** Gould. (Pl. xxv.)

This species was only twice met with, and this was in the Sind valley, Kashmir. [*G. H.*]

It is extremely common (at elevations of from 6000 to 9000 feet) in all parts of the Himalayas south of the first snowy ranges, but does not appear to penetrate to many places beyond these. Dr. Jerdon, I see, gives it as chiefly

PASSER CINNAMOMEUS.



a N. W. bird, but it is very common throughout Kumaon, and I have numerous specimens procured in the neighbourhood of Darjeeling. As Mr. Blyth correctly surmised, it is essentially a Tree Sparrow. He remarks that this species only differs from *P. rutilans* (Temm. Pl. Col. 588, fig. 2) of China, by the yellow tinge on the cheeks and lower parts. I note that in the "Table Méthodique" the name is altered to *P. russata*, under which name *both* sexes are well figured in the "Fauna Japonica" (t. 50). Here it may be remarked that what is there figured and described in the text as the young must, judging from the analogy of the present species, be the adult female.

This latter has not been correctly described by Dr. Jerdon. I have repeatedly taken the nest and killed both birds of the pair, so that there can be no mistake about what the female really is. The female is not by any means light brown above, but is a warm, at times faintly ruddy, at times somewhat olive brown, marked on the back with black streaks much like the male and conspicuously ruddy on the rump. She has a long well-marked yellowish white supercilium extending from the lores right over the eye and ear-coverts to the nape. The under surface is yellowish-white, brightest at the base of the throat and the abdomen, and slightly ashy on the breast and sides. I notice, what Dr. Jerdon omits, that the bill is nearly black in the male, horny, brown and fleshy, or yellowish at the base of the lower mandible in the female; and that in both sexes the legs are fleshy or reddish-brown, paler and dingier in the female, and the soles yellowish. The birds breed in May and June, making a loose nest, much like that of *P. flavicollis*, in holes of trees.

In shape the eggs are typically very perfect moderately elongated ovals, scarcely compressed or pointed at either end. They vary a good deal in appearance; many closely resemble common varieties of those of the House Sparrow, having the ground colour white, greyish or greenish white, more or less thickly speckled, spotted, streaked or blotched with various shades of brown, chiefly sepia brown. In this type of egg the markings are generally densest at the large

end, where they are often more or less confluent and even form a broad irregular mottled cap. Others again closely resemble the egg of *P. flavicollis*, and are so densely streaked and smeared all over with sepia brown as to leave little of the ground colour visible. A third type has the ground colour a faintly brownish grey, and exhibits a well-marked zone of dark sepia brown about the large end, and only a few specks, spots, and streaks of the same colour scattered over the rest of the surface of the egg. In size they vary much—viz., from 0·72 to 0·92 in length, and from 0·55 to 0·65 in breadth; but usually they measure about 0·75 by 0·56. Referring to what Mr. Blyth says of the distinctness of *Passer russatus* I should much like to see fresh specimens of this latter, because the yellow tints of the lower surface of this species are very fugitive, and I have specimens of it which have been for some time exposed to the light which correspond exactly with the figures in the "Fauna Japonica." [*A. O. H.*]

710. **Passer montanus,** Linn.

The Tree-Sparrow of Europe is the House Sparrow of the City of Yārkand, where it is almost as familiar and impudent as the English or Indian House Sparrow. It was seldom noticed in the fields or indeed anywhere except in and about the houses. In Turki it is called *Chum Chuk*. [*G. H.*]

This species is never met with, as far as my experience goes, in Kashmir or Ladāk, Kulu, Spiti, Lahul, Garhwāl or Kumaon, or generally anywhere in the Himalayas west of Nipāl; but at Darjeeling this is the common House Sparrow during part of the year; and further east and south, in Assam, Tipperah, and Burmah it seems to be the only House Sparrow. [*A. O. H.*]

712. **Emberiza leucocephala,** Gm.

This species was met with in October in large flocks near Sónamarg in the Sind valley. They were flying backwards and forwards and seemed very restless, only settling on the ground for a few minutes at a time. They had probably been driven down from the pine forests above by

a fall of snow, which had occurred a few days previously. A good number of the next species were mixed up in the flocks. [*G. H.*]

We never get this species except in the winter, and then it is in a stage of plumage that I have never seen correctly described, and a description of which I therefore subjoin.* No one could well recognise our birds, either from Bree's figure of the summer plumage, or Dr. Jerdon's description; his "dark rufous moustachial line" and "triangular patch of white on the throat," belong to a stage of plumage that I have never met with. Dr. Henderson notes of a male—length, 6·25; tail from vent, 3; foot—greatest length,

* *Emberiza leucocephala.*

Winter plumage: Male.—Lores, orbits, sides of the head, chin, throat, cheeks, and upper portion of sides of the neck deep chestnut, the feathers more or less edged with white. Enclosed within this chestnut is a white patch, which beginning as a streak from the gape, expands and covers the whole ear-coverts, and is faintly bounded by a dusky line. From the forehead on either side of the crown, immediately above the chestnut of the lores and orbits, is a brownish grey band, containing two blackish brown streaks. The whole space of forehead, crown, and occiput enclosed between these two bands is white, the feathers tipped more or less with brownish grey. The nape is greyish brown. The back a pale yellowish brown—the feathers with dark brown centres and more or less tinged towards the tips with rufous. The rump and upper tail-coverts bright chestnut, the feathers narrowly tipped with greyish white. Tail-feathers dark brown, the central ones somewhat broadly, the laterals narrowly, edged with fulvous fawn. The exterior lateral feathers white for the terminal two-thirds, the penultimate for the terminal half, except a dark brown shaft stripe. The scapulars, tertials, and secondary greater coverts broadly tipped with rufous fawn, paling towards the edges. Secondary median coverts rather conspicuously tipped with rufescent white. Secondaries, primaries, and their greater coverts grey brown, very narrowly margined on their exterior webs with rufous fawn or rufescent white. Breast, abdomen, vent, lower tail-coverts, and wing lining, white, mottled across the middle of the breast and streaked on the flanks and irides with pale chestnut.

Female.—Top and back and sides of the head, including ear-coverts, a warm fulvous brown, the top and back of the head with central dark brown stripes. No trace of the white crown patch of the male until the feathers are lifted, when the central portions of the feathers of these parts are seen to be white. No chestnut anywhere about head, neck, or throat. No white on the ear-coverts. The whole of the rest of the upper parts similar to the male but somewhat warmer coloured. Throat yellowish white. Breast, sides, and flanks pale yellowish brown, the feathers with dark brown central striæ.

1·25; wings when closed reach to within 1·75 of end of tail; legs and feet flesh-coloured; bill horny; irides brown.

713. Emberiza Cia, Linn.

The Meadow Bunting, as this species is misnamed, was common all through Kashmir, from above Jamu to near the Zoji-lá Pass; beyond this it was not met with. It frequented low jungle and grassy hill sides. [*G. H.*]

I am not by any means certain that our Indian bird is identical with the European *E. Cia*, and I do not think good series of each have ever been compared. In Palestine, Canon Tristram tells us that *E. Cia* "is certainly not a Meadow Bunting, being found only on the tops of the hills and in the highest parts of Lebanon both in summer and winter," and much the same may be said of it in the Himalayas, west of the Ganges (I have seen no specimens east of this river), throughout which it resides the whole year round at heights of from 5000 to 9000 feet.

With us it lays in May and June; the nest is always on the ground, commonly wedged in under some large stone, or inserted between the blocks of the rough stone walls with which the hill sides are terraced, but occasionally placed at the base of some dense tuft of grass or shrubby bush.

The nest is generally a shallow, loose, but pretty perfect cup, from three to four inches in diameter, externally composed of grass stems and lined with finer stems of the same and a few horse or other animal's hairs or moss roots. A nest of this species obtained near Kotghur was a moderate sized pad of grass about five inches long by about four broad and perhaps two inches in thickness. Towards one end of this was a beautiful little saucer-like cavity perfectly circular about 2 inches in diameter and 0·75 in depth, lined with very fine grass stems, and this again at the bottom of the cavity with fine white hairs, but of what animal I am uncertain; they are much too fine for horse hair.

The eggs of this species are typically moderately elongated ovals, perfect and regular in this shape; they have little or no gloss, and the ground is a very pale greenish

white, or grey, or brownish stone colour. Their markings consist of the most delicate and intricate tracery of fine dark brown, in some places almost black, lines drawn over faint and pale inky-purplish streaks or marbling. Here and there a black or dark brown spot, like a fly caught in a spider's web, is seen amidst the tangle of lines that so specially characterize the eggs of this species and others of the Bunting family. These lines I may remark are commonly mostly confined to the large end of the egg, where they form in some a tangled cap and in others a broad irregular but conspicuous zone. I do not think that Dr. Bree's figure of the Meadow Bunting's egg conveys at all a good idea of the eggs of the Indian *E. cia*. The lines are much too few in number and too coarse and thick. Hewitson's figure of the Yellow Ammer's egg much more closely resembles our eggs, but even in this the lines are neither sufficiently numerous nor fine. Anything more elaborate or intricate than the labyrinth-like pattern of hair-lines exhibited by some of the eggs before me can scarcely be conceived. These very fine lines and the manner in which they are disposed about the larger half of the egg, remind one forcibly of the very similar lines met with in the little *Drymoipus inornatus*. In size the eggs most closely approach those of the Cirl Bunting, and out of a very large series, only one is as large as that figured by Dr. Bree. The eggs of our bird vary in length from 0·72 to 0·92, and in breadth from 0·6 to 0·68. It is just possible, as above noticed, that our common Himalayan Bunting may require to be separated specifically from the *E. cia* of Europe.

725. **Hesperiphona icterioides** (Vigors).

One specimen was obtained at Sónamarg, Kashmir, on the 19th of June. [*G. H.*]

This species breeds in May and June everywhere in the pine forests from 6000 to 9000 feet high, south of the first snowy ranges. It breeds also in Kashmir about the same time. Though continually heard, this species keeps habitually so high up on the pines, that it is not very often seen. [*A. O. H.*]

732. **Pyrrhula aurantiaca,** Gould.

This beautiful species was very common about the head of the Sind valley. It was met with on the road side in June and in October, and was quite tame and fearless. It associated in small flocks about six in number and flew from bush to bush, feeding on berries. It was met with in no other locality. The elevation at which it occurred was from about 7000 to 8000 feet. [*G. H.*]

737. **Carpodacus rubicilla,** Guldenstadt.

One fine specimen, marked a female at the time, but obviously, I think, a male in full summer plumage, with a wing 4·75 in length, was obtained on the 9th October near the Pángong lake. Two young birds of the same species, clearly fledged but recently, were obtained on the 13th and 15th August at the Arpalak river. It is therefore probable that we have here one at least of the breeding places of this rare species.

My notes of the first-mentioned bird are: length, 8; tail from vent, 4; expanse, 13·75; foot, greatest length, 1·25; wings when closed reach to within 1·5 of end of tail. Legs and feet black; bill ashy. Of one of the young birds I note: length, 7·25; tail from vent, 3·25; expanse, 12; legs and feet brown; bill yellowish; irides brown. [*G. H.*]

The newly fledged young of this species has never, I believe, been described. It has the whole head, neck, breast, back and scapulars dull pale earthy brown, more or less yellowish in places, the feathers very lax and showing everywhere a great deal of the basal, three-fourths of the feathers of which are a pale blue grey. Abdomen similar but paler, lower tail-coverts brownish white, the shafts brown. The wings are pale hair-brown, most of the quills and coverts more or less broadly margined with dull pale yellowish earthy brown, only the earlier primaries excessively narrowly margined at and near their tips with brownish white. Tail pale hair-brown, exterior web of outer laterals fawny white, other feathers margined on their outer webs with pale yellowish brown. [*A. O. H.*]

738. **Carpodacus erythrinus** (Pallas).

The Scarlet Bullfinch was very common in June and July, in Kashmir, from the Sind Valley, and in Ladák to the first pass beyond Lé. The birds were in small flocks, and as all the specimens obtained were males in full breeding plumage, and no females were noticed, it is probable that these were sitting at the time, and that this species breeds in both provinces. It was not observed in the high desert regions, nor in Yārkand, and when the expedition returned none were seen in either Ladák or Kashmir. [*G. H.*]

The birds had by that time doubtless returned to the plains, where I have killed both old and young early in September. I do not think it has ever been noticed, that old females often have a dull orange patch on the chin, and a tinge of the same colour on the forehead. [*A. O. H.*]

741. **Propasser rhodochlamys** (Brandt).

A single specimen, a female, apparently of this species, was obtained in Ladák on the banks of the Indus near Lé, [*G. H.*]

It corresponds in plumage with other specimens that I possess, and with Gould's figure, but the dimensions are unusually large. Length, 7·5; wing, 4·1!

This species is only a winter visitant to the British Himalayas. At that season it is not very uncommon, and one or two specimens are to be found in every collection made during the cold weather, near Darjeeling, Almora, Massuri, Simla, and Murree. [*A. O. H.*]

751. **Metoponia pusilla** (Pallas).

This species was met with in immense flocks, both in July and October, almost throughout Ladák, from Drás to Fota-lá Pass. It was observed feeding on the flowers and seeds of an *Artemisia*.

It probably breeds in May, and not impossibly in Ladák. When in flocks the sexes seem to keep apart, as out of some flocks a number of males only would be shot, while out of others nothing but females were obtained.

These birds are very restless, constantly on the move, flying from bush to bush along the hill-side, and making a low chirping noise. My notes of one fine male are:—length, 5·75, tail from vent, 2; wing, 3·1; expanse, 8·75. Bill, legs and feet, black. [*G. H.*]

Later in the autumn, the Golden-fronted Finch retreats further south, and enormous numbers swarm over the lower ranges nearer the plains, at heights of from 4000 to 7000 feet. I have known of thirty being killed at one shot, near Kotegurh, in the valley of the Sutlej. [*A. O. H.*]

751 (*bis*). **Linota brevirostris,*** Gould. (Pl. xxvi.)

Three specimens of this rare bird were obtained on the banks of the Arpalak river, in Hill Yârkand, only a short distance from where the plains commence. [*G. H.*]

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* I reproduce Moore's original description and measurements. (P. Z. S., 1855, p. 217.)

"Allied to *L. montium*, but distinguished from that species by its lighter colour, and the male having the pink colour on the rump paler; the axillaries and the basal edge of the inner web of the primaries and secondaries pure white; the primaries and secondaries above are also broadly margined exteriorly with white. The female is also paler, and broadly edged, as in the male, with white.

Length, 5 inches; of the wing, 3·87; of tail, 2·62; centric feathers, 0·5 less; bill to frontal plumes 0·3; to gape, 0·5; tarsus, 6·6; centre toe and claw, 0·62."

This description agrees well enough with the Ladák, Sikkim, and Yârkand birds, but the dimensions seem in one respect scarcely reconcilable. None of the birds before me were measured in the flesh, but the wing in which the greatest difference exists, as compared with Moore's dimensions, cannot have much changed in drying, besides which Moore's measurements must, like ours, have been taken from the dry skin. All the five birds before me are much about the same size.

Dimensions.—Length (allowing for the contraction of the skins and carbolized specimens), 4·8 to 5 inches; wing, 3·1 to 3·2; tail, 2·4 to 2·5; centre feathers, 0·3 less; bill to frontal plumes, 0·29 to 0·35; to gape, 0·4 to 0·45; tarsus, 0·58 to 0·61; hind toe and claw, 0·5 to 0·58. The first four primaries seem to be almost the same length, in some the second and in some the third are the longest, and in all the first is about 0·05 shorter than the longest.

Description.—The legs and feet are brown, the nails long and slender, the bill (apparently) fleshy, yellow brown at the tip.

Plumage.—The whole head, neck, back, wing coverts, chin, throat, and breast, pale earthy, dingy fulvous, or pale sandy brown, in different

LINOTA BREVIROSTRIS.

This species is occasionally found in Ladák, and I have a specimen obtained somewhere in Northern Sikkim. It was originally described from "Erzeroum and Afghanistan." [*A. O. H.*]

Montifringilla hæmatopygia* (Gould).

This species was first met with after crossing the Chang-lá Pass above Lé. From thence it was seen at almost every

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specimens. The feathers of the crown, back, and breast, centered darker. Axillaries, wing lining, abdomen, vent, and lower tail-coverts white, tinged slightly fulvous on the abdomen; sides and flanks with a few faint yellowish brown streaks. Tail, (which is much forked, and has all the feathers, but specially the central ones, acutely pointed,) dark brown, greyer on the laterals; all but the central feathers, with the major portions of the outer webs white, and with the inner webs margined white, very broadly in the exterior laterals, and less and less broadly in each succeeding feather. Primaries and secondaries hair brown, the former margined with pure white, most broadly in the fifth to the eighth, the latter tipped with somewhat yellowish white. The inner webs of both more or less broadly margined towards their bases with white.

The rump is, in the *male*, pale vermilion pink; in the *female*, unicolorous with the back. The upper tail-coverts (which are rather long and very pointed,) are in both sexes a darker brown than the back, and are edged with white.

I do not doubt that this is *Linota brevirostis*, and that Moore's measurement of the wing is erroneous, but if he is correct our bird is distinct and might stand as *Linota montanella*.

* *Montifringilla hæmatopygia* (Gould).

Dimensions.—Length, 6·9 to 7·25; wing, 4·5 to 4·75; second primary longest, first, 0·1; second, 0·03; fourth, 0·25; fifth, 0·68; sixth, 1·0 inch shorter. Tail from vent, 3·1 to 3·5. Exterior tail-feathers 0·35 longer than central ones. Tarsus, 0·8; mid-toe to root of claw, 0·65; its claw, straight from root to point, 0·25. Hind toe, similarly, 0·28; its claw, 0·38. Bill at front, 0·43 to 0·48. (The females are slightly smaller than the males.)

Description.—Bill, legs, and feet, black; irides brown.

Plumage.—The *male* has the forehead and lores deep, almost blackish brown, the crown, cheeks, and ear-coverts somewhat paler and the hind head paler still, the colour fading gradually. Upper back again paler and the feathers more or less margined with pale brown, the scapulars pale grey brown, the feathers with narrow ill-defined darker brown central streaks. Mid-back pale greyish brown; rump similar, but each feather tipped narrowly with crimson. Upper tail-coverts pale whitey brown, margined paler. Tail-feathers very dark brown, the exterior laterals with the whole, and the penultimate with nearly the whole of the outer webs, yellowish white. All the rest of the feathers margined with white very

encamping ground, until the expedition descended to the Karakāsh river. It was never met with below 14,000 feet, and often as high as 17,000; at these great heights it was almost the only resident bird met with. [*G. H.*]

This species is not confined to Ladák. I have two specimens from Sikkim, one killed by Captain Elwes, at Kangra Lama, at an elevation of 15,000 feet. [*A. O. H.*]

752 (*ter*). **Montifringilla Adamsi,*** Gould.

This species was met with in June, about Karbu, Ladák; but all the specimens then obtained had black bills.

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narrowly except on the outer web towards their bases. Winglet, primaries and secondaries, and primary greater coverts dark brown, paler and greyer on the inner webs, and all margined exteriorly, the later primaries and the secondaries more broadly, and the rest very narrowly, with white or yellowish white. Lesser most of the median coverts, whitey brown. Chin brown, throat and breast whitey brown, becoming albescent on the abdomen, and nearly pure white on the lower tail coverts. Some few of the feathers of these parts slightly darker shafted. Wing lining and axillaries slightly greyish white. The *female* has the front of the head somewhat less dark, and has less of the crimson on the rump. She is also slightly smaller.

* *Montifringilla Adamsi* (Gould).

Dimensions.—Length, 6·6 to 7·; expanse, 12 to 12·5; wing, 4·1 to 4·5; second primary longest; 1st, 0·08; third, 0·1; fourth, 0·45; fifth, 0·75; sixth, 1·05 shorter. Tail from vent, 2·6 to 2·85; exterior tail-feathers, 0·2 shorter than central ones. Expanse 12·3 to 12·8. Tarsus, 0·8. Foot, greatest length, 1·5; greatest width, 1·0; mid-toe to root of claw, 0·6; its claw, straight from root to point, 0·17 to 0·25. Hind toe, similarly, 0·26; its claw 0·25 to 0·4. In old birds the claws get worn down very short. Bill at front 0·48 to ·52.

Description.—Legs, feet, and claws, black; irides brown; bill, black in summer, orange yellow dusky on culmen and brown at tip in winter.

Plumage.—In summer: the whole of the top of the head, nape, back scapulars, and rump, pale brown, darker and greyer on the head, paler and duller on the back of the neck; central upper tail-coverts, blackish brown; lateral ones, white. Central tail-feathers blackish brown, scarcely perceptibly margined with fawn. Lateral tail-feathers, pure white, tipped for about 0·25 with blackish brown very narrowly margined with fawn. Lesser wing coverts and tertiaries nearly unicolorous with the portions of the back they adjoin. Greater coverts of primaries white except the tips and bases, which are greyish brown. Secondary greater coverts, broadly tipped white. Primaries and secondaries, very dark brown, the earlier of the former narrowly margined on the outer webs

Returning in October, it was observed in large flocks, at the same locality, and all the specimens then preserved had yellow bills. They occurred at a height of about 13,000 feet, at the Fota-lá Pass. [*G. H.*]

Gould is, I think, in error in considering the yellow bill a mark of immaturity. Looking through a large series, I find that all summer killed specimens have black, and all autumnal and winter specimens yellow bills. Some of those with yellow bills now before me are clearly old adult birds, with worn beaks. I consider the black bill to indicate the breeding garb. I know that this is the case both in *M. nivalis* and *M. arctoa*.

This is another species, widely spread throughout the higher regions of the Himalayas, beyond the first snowy range. I have a specimen from beyond Gilgit, another from Kumaon, beyond Budrinauth, and a third killed by Captain Elwes, at the Kangra Lama (wherever that may be) in Sikkim, at an elevation, according to the ticket, of 15,500 feet. Neither this nor the preceding species ever occur, so far as I have been able to ascertain, anywhere south of the first snowy range. Innumerable localities, apparently in every way suitable, and certainly high enough, are to be met with; but these and many other of the midland Himalayan birds are never to be seen there, simply, I believe, because exposed to the influence of the periodical rains—the climate is too moist. [*A. O. H.*]

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with yellowish white and the latter ones with a white spot on the inner web near the tip. The first secondary with two-fifths of the inner web white; the last with half the inner and two-thirds of the outer webs, of the same colour, intervening quills intermediate between these extremes in the amount of white. Wing lining, axillaries, and under tail-coverts pure white. rest of the lower surface yellowish white, tinged greyish on the throat, owing to the dark bases of the feathers showing partially through.

In the autumnal plumaged fresh moulted birds, the lores and feathers impending on the nostrils are whiter, the whole upper plumage has a faintly rufescent fawny tinge, the tertiaries and central tail-feathers are broadly margined with rufescent fawn, the lateral upper tail-coverts, the lower ditto, and the exterior margins of the lateral tail-feathers and some of the larger wing-coverts are tinged with the same colour, while the under surface is more decidedly yellowish white.

753. **Fringillauda nemoricola,** Hodgson.

This species was only observed on the return journey in any great numbers, and then it was seen in large flocks, in the upper part of the Sind Valley, in the same localities as *Emberiza leucocephala*. Of a male I note—Length, 6; tail from vent, 2·5; expanse, 11·25; foot, greatest length, 1·25; wings when closed reach to within 1 of end of tail. Bill horny; irides brown. Legs and feet black. [*G. H.*]

A single specimen was obtained on the 22nd of June, at Drás, in Ladák, and some few birds probably breed there; but it is still uncertain whither the mass of those innumerable flocks that swarm on the lower ranges of the Himalayas, at heights of from 4000 to 7000 feet, during the winter, betake themselves during the summer. No one would believe what countless multitudes of these birds throng at times every hill-side in the neighbourhood of Kotegurh, in the valley of the Sutlej, during the cold weather. They come and go in the most capricious fashion; one day not a bird is to be seen; then for a week, or a month even, they are so thick that, as one of my collectors graphically described it, "Whatever you shoot at, you are sure to knock over at least one of these Lark Finches." Then again suddenly they all disappear. They are doubtless graminivorous by preference, but I have found lots of small insects and, of course, numerous tiny pebbles in their stomachs. [*A. O. H.*]

761. **Calandrella brachydactyla** (Temm.).

Several specimens of this species were obtained in Kashmir and Ladák, in both of which localities it may yet prove to breed, and numerous nestlings, apparently of this Lark, were procured near Bálakchi, and along the Karakásh between the 31st July and 5th of August. A single adult male specimen, also procured in Bálakchi, in bleached and abraded plumage, while corresponding in every other respect with this species, has an unusually long, compressed, and pointed bill. It may be a mere deformity or accidental variety, but should other similar specimens be

MELANOCORYPHA TORQUATA.

obtained it would unquestionably deserve specific separation. Comparing it with a very large series of specimens, both European and Indian, it has the bill conspicuously longer, sharper, and more slender. So far as general appearance, legs, feet, and wings are concerned, it corresponds exactly with other specimens. If distinct, it might bear the specific name of *C. acutirostris* (*nobis*), and the nestlings may probably, some of them, belong to this species. [*A. O. H.*]

761 (*ter*). **Melanocorypha torquata*** (Blyth). (Pl. xxvii.)

A single specimen of this species was obtained on the return journey at the foot of the hills leading from Kashmir to the plains of the Panjáb. [*G. H.*]

The Bokhara, or Bugheira Lark, as it is commonly called, swarms during the cold season all over the Trans-Sutlej districts of the Panjáb and N. Western Rajpootana; and a certain number, finding their way further down, are met with in regularly decreasing numbers as one proceeds southwards and eastwards in the Cis-Sutlej Panjáb, the Doab as far down as Futtehpoor and Southern Rohilcund.

Dry, sandy cultivated lands, sparingly covered with the stubble of the rain crops, the giant and bullrush Millets (*Holcus sorghum* and *Pencilaria spicata*) are what they affect.

They have a very loud and sweet note, and are, I can

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* 761 (*ter*). *Melanocorypha torquata.*

Dimensions.—(The males are larger than the females). Length, 7·06 to 8; expanse, 13·13 to 15·25; wing, 4·2 to 4·8. The second primary is the longest, the first is sub-equal to 0·2 shorter, the third is from 0·13 to 0·3 shorter, and the fourth from 0·5 to 0·7 shorter. Tail from vent, from 2·12 to 2·4. Tarsus, 1 to 1·1. Foot, greatest length, from 1·6 to 1·95; greatest width, from 1·07 to 1·45; mid-toe to root of claw, 0·62 to 0·7; its claw, straight to root of point, 0·2 to 0·32; hind toe, 0·38 to 0·46; its claw, 0·45 to 0·6, in single specimen, 0·8. Bill, straight from forehead to point, 0·6 to 0·7; from gape, 0·7 to 0·9; height at front, 0·2 to 0·25. The closed wings fall short of end of tail by from 0·38 to 0·87. Weight from 1·25 oz. to 2·13 oz.

Description.—Legs and feet fleshy or yellowish fleshy, more or less dusky at joints; claws dusky; irides brown, in some light brown. Bill, horny brown, or blackish horny on upper mandible, lower mandible greenish horny changing to yellow at base and gape.

well believe, grand songsters in the nuptial season, but they leave us with the first breath of the hot wind, and breed, it is believed, in Afghanistan, Bokhara, and Persia. It is probably this bird which was found by Canon Tristram on Mount Hermon and Lebanon. This species much resembles the Calandra Lark (*M. calandra*) of Europe, but it is somewhat smaller, and has the wing shorter. The bill in this species is considerably less, in fact is intermediate between that of *M. calandra* and *M. tartarica* The dark collar or gorget is broader, I think, than in *M. calandra*, and is almost always divided in front by a broader or narrower line of white, whereas, though otherwise figured and described by Brec, all the four specimens of *M. calandra* that I have seen have the gorget virtually continuous. I have, however, one specimen of *M. torquata*, an old male, in which the gorget is continuous, one or two whitish feathers towards the centre being the only trace left of the usual division, so this probably varies in different individuals in both species. In the Calandra Lark the outer webs of the three first primaries are conspicuously margined in the male, less so in the female, with fulvous white. In the Indian *M. torquata* the edging is duller, less in extent, even on the first, and diminished to the merest line on the second and third. The external tail feather in *M. calandra* is white, except on the basal half of the inner web, which is greyish brown. The next feathers are more narrowly tipped and margined white, and the rest (except the central ones) are excessively narrowly tipped and margined towards the tips. In *M. torquata* the exterior feathers are dark brown, with only a very narrow margin of fulvous white on the outer web, and a patch of white at the tip, chiefly on the inner web. The next three or four feathers were similar, so that while there is four times as much white on the exterior feather of *M. calandra* as on that of *M. torquata*, there is *less* white on the antepenultimate of the former than on that of the latter. Then the secondaries of the Calandra Lark are pretty broadly tipped with white, of which there is no trace in the Bugheira Lark. On the other hand, in the latter the lores are whiter, the

dark streak through them plainer, and the supercilium much whiter, broader, and longer. The claws are on the whole I think, a little longer, but the length of these, especially of the hind one, varies so greatly in different individuals that it is difficult to be certain. I have an old male *M. torquata* with the hind claw ·8 inch long, and another female with the same claw barely ·45 in length. The legs of our Indian bird are paler, the bills rather darker.

764. **Otocoris longirostris,** Gould.

The Himalayan Horned Lark was met with from the first pass above Lé until the Expedition left the Karakāsh valley going to Yārkand, and in the same localities returning. Is was usually found near water at from 12,000 to about 15,000 feet. Where you cease to find moss and running water it is no longer seen, and in the higher regions it is, so to say, replaced by *Montifringilla hæmatopygia*. Going up every pass, it was met with to a certain height, where it disappeared; going down the other side of the pass, it was again met with at the same elevation. Where it feeds was not noticed, but it was always seen coming in small flocks down to little pools of water to drink. It is a very conspicuous bird and varies considerably in size. It was almost the only bird met with on the Khush Maidan, a wretched desert, which a native when questioned as to its name, ironically, or on the lucus a non lucendo principle designated as above,—in other words the *happy* or *pleasant* plain! [*G. H.*]

Moore's original description of this species, which Jerdon copies verbatim is very unsatisfactory, and I therefore subjoin* a somewhat fuller one. I need not say that this

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* *Otocoris longirostris*, Moore (ex Gould, MSS.).

Dimensions.—*Male.*—Length, 8·5; expanse, 14·5; wing, 5·2. First three primaries sub-equal, first slightly longest, fourth 0·1, fifth 0·55, sixth 1·0 shorter than first. Tail from vent, 3·75. Bill at front, 0·55; from gape, 0·8. Tarsus, 0·92. Mid-toe to root of claw, 0·55; its claw, straight from root to point, 0·35; hind toe to root of claw, 0·31; its claw, 0·55.

Female.—Length, 7; wing, 4·5. Proportions of primaries similar to those of the male. Tail from vent, 2·75 to 3. Bill at front, 0·5; from

species never occurs either at Agra or anywhere else in the plains of India. It is essentially an Alpine bird. [*A. O. H.*]

766. **Alauda triborhyncha,** Hodson. (Pl. xxviii.)

This species was very common in Ladák, many of the examples obtained in October were young birds, with characteristic pale edgings to the feathers of the head and back. [*G. H.*]

This bird is very distinct from the European Skylark; it would seem not to have yet been figured, unless indeed

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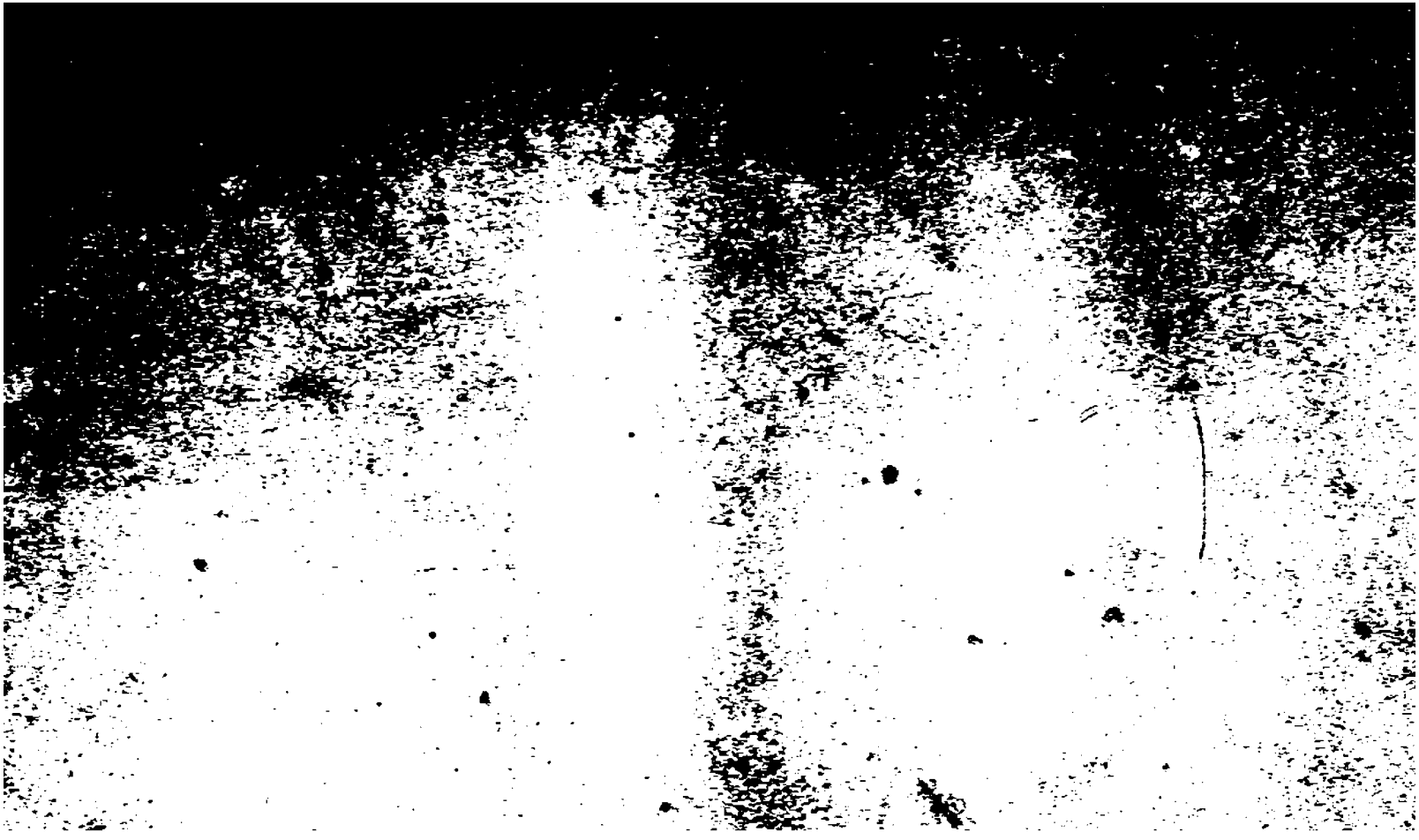
gape, 0·65. Tarsus, 0.8; mid-toe to root of claw, 0·46; its claw straight from root to point, 0·27; hind toe, 0·3; its claw, 0·37.

DESCRIPTION.—Bill, upper mandible and tip of lower, blackish brown. Rest of lower mandible bluish, tinged yellow towards the base.

Plumage.—Male fresh moulted, killed 9th October.—Lores, narrow band on the forehead, a broad cheek stripe running partly down the sides of the neck, the whole of the upper breast, a bar across the front of the crown, and the streak on each side of the crown (some of the feathers of which are linear, pointed, and fully 0·6 in length), and a small streak under the eye joining into the cheek stripe—velvet black, the bar on the front of the crown above being partly obscured owing to the tips of the feathers being vinaceous ashy. Forehead, between the two black bands, a broad streak over the eye extending nearly to the nape, chin, throat, and a broad border round the black cheek stripe, abdomen, vent, lower tail-coverts, axillaries, wing lining, nearly the whole of the outer web of the exterior laterals, and a portion of those of the penultimate ones, and nearly the whole of the outer web of the first primary pure white. Lower breast, sides, and flanks white, tinged with very pale slightly vinaceous, greyish brown. Centre of crown of head, nape, back and sides of the neck, back and scapulars, pale greyish brown, some of the feathers inconspicuously and narrowly darker centered, and the nape, and back, and sides of the neck distinctly tinged with vinaceous. Rump and upper tail-coverts pale fulvous fawn, the upper tail-coverts somewhat conspicuously brown shafted. Tail: central feathers hair brown, conspicuously and broadly margined with fulvous fawn, paling towards the edges. Lateral tail-feathers black, except as already described, faintly margined towards the tips with fulvous fawn. Quills greyish brown, third, fourth, and fifth primaries, blackish towards the tips; outer web of first primary white, other primaries narrowly margined white and tipped with fulvous fawn. Secondaries narrowly margined and tipped with white. Tertiaries somewhat darker brown at the base, but margined and tipped with fulvous fawn like the central tail-feathers. Primary greater coverts and lesser coverts more or less broadly tipped and margined with grey brown tinged with vinaceous.

Adult Female. Killed on the same date.—Similar to male but with the faint striations of the back of neck and back, &c., almost entirely obsolete—a brighter vinaceous tinge on crown, nape, back, and coverts,

ALAUDA TRIBORHYNCHA



ALAUDA GULGULA.

it should turn out, as I half suspect, to be identical with *Alauda japonica*. (Faun. Jap. Aves. t. XLVII.) [*A. O. H.*]

767. **Alauda gulgula,** Franklin. (Pl. xxix.)

A single specimen of this species was obtained near Srinagar in Kashmir in May. [*G. H.*]

It probably breeds in that country as well as in the plains. I notice that the Himalayan race of this species, generally differs from that of the plains, by having the bill shorter and slenderer, by being slightly darker-coloured above, by a somewhat shorter hind claw, and by the purer and less buffy-white of the exterior lateral tail feathers. Some specimens are undistinguishable, but hill specimens can generally be picked out by these characteristics. Even

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less black on the breast. More white on the two outer tail-feathers, and the central tail feathers nearly wholly rufous fawn.

Young Male. Killed same date.—Differs from the adult in having all the lateral tail feathers more or less conspicuously tipped with white. The breast white, surmounted by only a narrow line of black. The chin, throat, and eye-streak tinged with yellow. The cheek stripe and lateral crown stripes yellowish white, each feather with one or more narrow dusky black bars towards the tips. The vinaceous tinge on the wing coverts is even stronger than on those of either of the adults.

Young Female. Killed the same date.—Wants the vinaceous tinge of the plumage almost entirely; like the young male, has only a narrow black band across the upper breast. The frontal black band, as well as the black bands across the front of the crown and on either side of it, are wanting, and the cheek stripe and lores though partly black have all the feathers broadly tipped with yellowish white. The quills are paler coloured than in the adult, and the central tail-feathers may be described as very pale buffy fawn with a narrow brown shaft stripe.

A female killed in August is in such bleached and abraded plumage that it would scarcely be recognised as belonging to the same species. The lores and the cheek stripe and the pectoral band are dusky brown, a dingy white line runs from the nostrils over the eyes, and the whole crown and occiput is dusky, only just the extreme tips of the feathers retaining the original grey brown shade. The lower breast and abdomen are mingled dusky and fulvous white owing to the bases of the feathers showing through. The back of the neck and back is pale sandy, the feathers somewhat darker centered, while the upper tail-coverts and central feathers, are dull pale rufescent sandy. I have never obtained the bird in full breeding plumage, but I should imagine that it did not differ greatly from the freshly moulted October plumage. [*A. O. H.*]

the hill race is distinctly separable from *A. triborhyncha*, by its smaller size, shorter wing, proportionately longer bill, less ample crest, and paler colour. [*A. O. H.*]

769 (*ter*). **Galerita magna**, Hume. (Pl. xxx.)

This species, which I can nowhere find described, closely resembles *G. cristata*, but it exceeds it in size, and has in the adult a fuller and longer crest. Its general tint is more sandy rufescent, more of a desert colour, than any specimens of *G. cristata* met with in the plains of India. [*A. O. H.*]

This species was common in fields in the plains of Yārkand. Some of the specimens obtained in August were quite young birds, and it is probable that it is a permanent resident and breeds there.

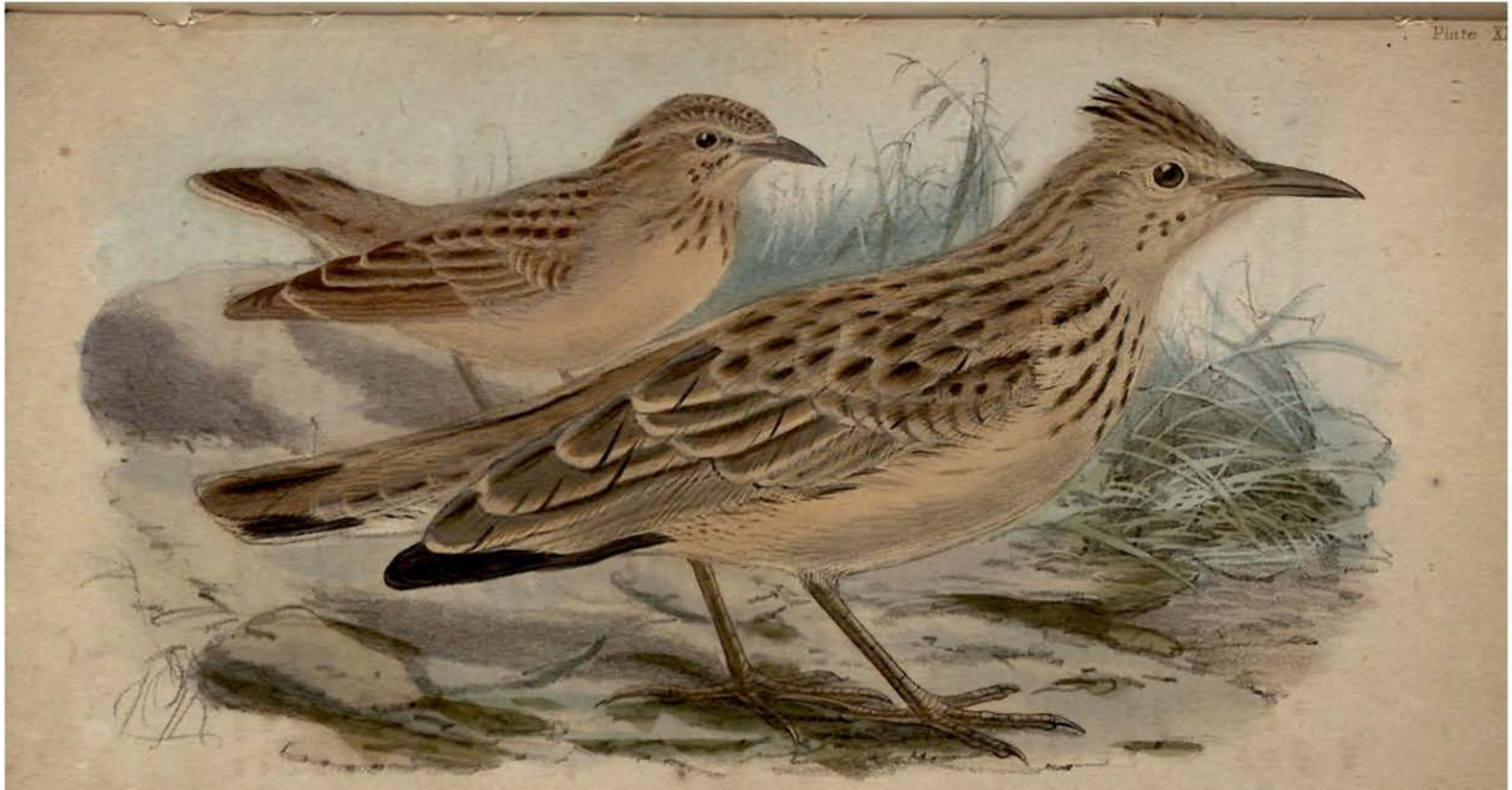
A male, not quite mature, measured: length, 8·0; expanse, 14·0; tail, 3·0; bill at front, 0·7; wing, 4·4; and the wings when closed reached to within 1 of end of tail. Another, an adult but moulting: has the wing, 4·45; and the bill at front, 0·75; a female, was: length, 7·15; expanse, 13. The legs and feet are flesh-coloured. The bill is fleshy, brownish on the culmen.

The Yārkandis call it "*Toghai.*" [*G. H.*]

778. **Sphenocercus sphenurus** (Vigors).

This species was common near the Chenab between Jamu and Banihál; it was not observed in the valley of Kashmir. [*G. H.*]

It is very common throughout the British Himalayas, south of the first snowy ranges, at heights of from 5000 to 7000 feet. It is one of those birds rarely found beyond the first line of snow. This species breeds from April to June, laying two or occasionally three pure white glossy eggs, which vary from 1·15 to 1·26 in length, and from 0·82 to 0·95 in breadth. The nests are composed of coarse and small dry twigs, loosely laid on some forked branch, and are most common at heights of from 4000 to 5000 feet. As my friend Mr. Thompson remarks *in epist.*, "the fruits of the *Myrica sapinda* or Kaphul which ripens about the



GALERITA MAGNA.

PALUMBŒNAS ENDSMANNI.

breeding season, form their chief article of consumption at this time." I again call attention here to the remarkable fact, long since noticed by Captain Hutton—viz., that to the Himalayas, at any rate west of the Ganges, the Kokila is only a spring and summer visitant. At Massuri for instance, they arrive early in the summer, rear their young and retire family by family as the autumn sets in. In the valley of the Sutlej near Kotegurh they are common in the summer, but not a straggler is to be seen there in winter. Where do they go to? Not further into the interior of the hills certainly, for they could find no food there; not to the low warm valleys at the foot of the hills. None are ever to be seen in winter, even in the Dhoon, where food is abundant and the *Crocopi* remain all the year round. They must migrate eastward, but I cannot hear of any considerable autumnal influx of this species into Assam, Tipperah, or elsewhere. The matter is really worth the investigation of Indian ornithologists; vast multitudes of a large and conspicuous species, tenanting during the summer a zone of hills varying from 20 to 100 miles in width, and stretching at any rate from the borders of Afghanistan to the banks of the Ganges at Hurdwar, absolutely desert us during the autumn and winter, and no one has as yet been able to explain satisfactorily where they go to. [*A. O. H.*]

787. **Palumbæna Eversmanni,** Bp. (Pl. xxxi.)

A single specimen, a male, and possibly a young bird, was shot on the 8th of October at Chágra above the Pángong lake, at an elevation of 16,000 feet. [*G. H.*]

This bird is precisely similar to numerous specimens killed by myself during the cold season in the Sirsa district of the Panjáb. It had (according to Dr. Henderson's note) the legs, feet, and tip of the bill, both pink and reddish pink. The colours of these parts are somewhat variable according, I think, to age.

This species visits the plains of Upper India (rarely wandering more than 150 miles from the foot of the hills) in large flocks during the cold weather. They take

up their residence in some clump of trees, near some pond or tank, and often in the close vicinity of villages, and there they roost at night, and in the early morning and at dusk they are to be seen, clustered thickly on the topmost boughs; during the day not a bird is to be seen, the whole colony disperses far and wide over the country in pairs or little parties of from three to seven. They come in November, and disappear towards the end of March, feeding always like the common pigeon on grain of all kinds.

They are not known to breed anywhere in our hills; probably they all go to Central Asia during the hot season, and the specimen obtained by the Expedition was doubtless on its way to the plains. [*A. O. H.*]

788 (*bis*). **Columba neglecta,** Sp. nov. ?

One specimen of a pigeon, a male, shot in Ladák, on June 26, 1870, is a typical example of the species (of which I have very numerous specimens) which (having no specimens of *C. livia* and *C. Schimperi* to compare with) I have called *C. neglecta*. This species may be at once distinguished from *C. intermedia* by its *much* darker general hue and by its white, or more or less greyish white lower back, contrasting strongly with the blackish-slaty rump and upper tail-coverts. This species replaces *C. intermedia*, in most places in the interior of the Himalayas. The other specimen, a female, shot at Drás, June the 23rd, belongs to what seems to be a hybrid race between *C. neglecta* and *C. intermedia*. The general colour of the upper back, scapulars, and coverts, is that of *C. intermedia*, but the lower back is a pale albescent grey or bluish-white, very different from that of the latter, and resembling in this respect *C. neglecta*, but not contrasting so strongly with the dark iron-grey rump and upper tail-coverts as does the white lower back of *C. neglecta*. This hybrid race (if such it be) is common in the outer ranges of the Himalayas, and I have shot it during the cold season in the plains, especially in districts near the foot of the hills. This race has been characterized by Captain Hutton *in epist.* as *Columba*

spelæa, but I scarcely think that it merits specific separation.

In this present species or race (*C. neglecta*) the wings of the female average about 8·5, and of the males 8·75, being an inch shorter than the recorded measurements of *C. livia*. Moreover, according to Macgillivray's description, the whole back of *C. livia* from near the shoulders to near the tail is pure white, whereas in this species the band of pure white across the lower back never exceeds 1·25, and in some specimens is scarcely above an inch in extent. The whole rump, upper tail-coverts and basal portion of the tail is a very deep slaty grey, contrasting very strongly with the white of the lower back. In the intermediate form the white is more or less tinged with grey, and the conspicuously white portion of the back does not exceed half an inch in breadth.

789. **Columba rupicola,*** Pallas.
„ rupestris, Bp.

One specimen of this species was procured at Lé on the 4th July, where enormous flocks of Pigeons were observed, but it was not at the time discriminated, and it is not certain whether these colonies consisted entirely of this species, or whether other species were intermingled in the flock. [*G. H.*]

The description given by Major Boys, and quoted by Dr. Jerdon (vol. iii. p. 470), is excessively accurate, except that he fails to notice the deep vinaceous purple tinge which extends over the greater portion of the breast. The bird is considerably larger than *C. intermedia*, and much paler in colour; the specimen obtained measured 14·0 in length, wing 8·5, tail 5·5, tarsus 1·2, mid toe to root of claw 1·06, its claw straight from root to point 0·4, bill at front 0·63, bill from gape 0·82. The white band on the tail feathers is about 1·15 broad on the centre tail feathers, and below this band the black slaty tint extends for about 1·2; on the outer tail-feathers the white band is nearly 1·4 wide, and

* In regard to this being the true *C. anas var. rupicola daurica*, Pallas, vide No. 792, infra.

the black tipping only about 0·73 wide; the tail is a good deal rounded, the exterior feathers being 0·43 shorter than the central ones; the legs and feet bright red, a colour which they retain in all its brightness in the stuffed specimen; claws dusky. This specimen is peculiarly interesting, because, as far as I am aware, it is the only Indian killed one that has been preserved. It may be noticed that the tips of all the primaries are brown, and that in the later ones this colour extends as a marginal band a considerable distance along the outer web.

This species never occurs near Massuri, nor in any other part of the Himalayas, to the best of my belief, below 12,000 feet. I have never before seen a specimen. [*A. O. H.*]

790. **Columba leuconota,** Vigors.

A single specimen was obtained in June near Drás, where it was very abundant; it was a female, and measured—length 13·0, expanse of wing 34·5, and length of do. 8·9. [*G. H.*]

During the summer this species is doubtless, as Dr. Jerdon remarks, chiefly found at heights of from 10,000 to 14,000 feet far in the interior of the Himalayas, but during the winter it descends to the lower ranges, is common about Simla, Massuri, Murree, &c., and the valleys below them, at elevations of from 3500 to 7000 feet, and occasionally stragglers are killed quite at the foot of the Hills. This species is not confined to the North West. I have it from the Sutlej Valley, east of Chini, from Kumaon, beyond the Dhuj, on the borders of Nepāl, and again from the Hills north of Darjeeling, but from exactly what locality I am ignorant.

792. **Turtur vitticollis,** Hodgson.

Turtur rupicola (Pallas, apud Jerdon).

This species was met with in considerable numbers in the Sind Valley, Kashmir, feeding on the mulberries. It is there called "*Kookail.*" [*G. H.*]

I have unfortunately no copy of Pallas's "Zoographia"

by me to refer to, but from notes which I made when going through the work I feel almost confident that Bonaparte was wrong in identifying Pallas's var. δ *C. oenas*, var. *rupicola daurica*, with *T. gelastis*, Temm. (*Gelastes, apud Bp. et auct.*). I cannot make out how the mistake occurred, but, according to my notes, Pallas both figures and describes under the head of *C. rupicola* the species already noticed as *Columba rupestris*, Bonap., a Pigeon, and *not* a dove, though Bonaparte says the contrary. Having called attention to this point, I must leave European ornithologists (who possess the inestimable advantages of large libraries to consult) to settle this point. But whether *T. rupicola* and *T. gelastis* are or are not identical, I do not think that our Himalayan and Indian bird can be identified with either, at any rate if these are held distinct from the European *T. auritus*.

I subjoin comparative measurements of the Indian and European bird, as well as of *T. gelastis*, from both Japan and the Amur :—

	Turtur vitticollis, Hodgs. ex Ind.	*Turtur gelastis*, ex Faun. Jap.	*Turtur gelastis*, ex V. des. A. L. Schrenk.	*Turtur auritus*, ex Eur. et Yürk.
Length	12 to 14	11·7	—	11 to 11·3
Wing	7 to 7·55	7·43	7·35 to 7·67	6·3 to 7·1
Tail	5 to 5·5	5·1	5·11 to 5·3	4·75 to 5·25
Bill at front	0·6 to 0·75	0·59	0·67	0·7 to ·75
Tarsus	0·9 to 0·1	0·85	1 to 1·05	0·8 to 0·85
Mid-toe to root of claw	0·95 to 1·02	0·96	1·05 to 1·17	0·95
Its claw	0·3 to 0·4	0·28	0·25 to 0·27	0·25

The European bird, it will be seen, is, on the whole, the smallest, although it has the longest bill; but *T. gelastis* and *T. vitticollis* differ quite as much, so far as mere measurements go, as do the former and *T. auritus*. Moreover, unless of each race or species the same large series of both sexes were carefully measured in the flesh, in the same way that I have measured our Indian bird, one could, even supposing mere differences in size sufficient to constitute a distinct species, scarcely arrive at any definite conclusion. But in regard to plumage, certain differences between the three races seem constant, our Indian bird holding, so far

as plumage is concerned, the same intermediate position between the Japanese and European races that it does geographically. From *T. gelastis* it appears to differ, in having, like *T. auritus*, scarcely any white tipping to the central tail-feathers, and in having the tips of the lateral tail-feathers and the exterior webs of the external laterals pure white instead of pale bluish grey, in having the lower tail-coverts nearly pure white, and the chin and throat much paler.

From *T. auritus* it differs in having, like *T. gelastis*, a richer vinaceous rufous tinge on the back, scapulars, and breast, by the tips of the feathers of the black neck spots being a beautiful blue grey instead of white, in having a coarser bill, and generally in its larger size. It also differs from *T. auritus* in the white tippings of the tail-feathers being narrower, and in having the middle and lower back, axillaries and wing-lining a more or less deep slaty blue, instead of greyish brown in the case of the two former, and light ash grey in that of the two latter.

The conclusions I come to, therefore, are (1) that *T. rupicola* of Pallas is a different bird altogether. (2) That our Indian bird differs nearly as much from *T. gelastis* as from *T. auritus*, and that if *T. gelastis* is maintained as distinct, so ought *T. vitticollis* to be, but that under certain views of what constitutes specific differences (views in which, however, I do not concur) it is quite admissible to unite them both with *T. auritus*.

So far from being only a winter visitant to the Hills, as Jerdon supposes, it is almost exclusively a summer resident only. A few birds remain in the lower valleys of the Hills, doubtless, but the great majority move downwards in the cold season to the plains of Upper and Central India. When I was stationed in the Etāwa district in the Doab, halfway between Agra and Cawnpore, this Dove used to pass down in November and up again in March. For two or three days on each occasion, every grove and every road-side avenue swarmed with them, but not a solitary bird was ever seen except on those two occasions in the year.

In Saugor in the central provinces they are common for some months in the cold weather.

Throughout the summer, this species abounds everywhere in the Himalayas, at any rate from the western borders of Nepal to Murree, at elevations of from 4000 to even 9000 feet, south of the first high snowy ranges. North of these I do not remember to have seen it, but Dr. Stoliczka talks of it as occurring in Western Thibet up to 12,000 feet.

As for the nearly allied *T. meena*, Sykes, which may be always distinguished by its darker or lighter slaty-grey or bluish under tail-coverts, it never I believe visits the Himalayas, at any rate west of Nepal.

Throughout Central and part of Southern India, in Raepore, Cuttack, Midnapore, Dacca, Assam, Cachar, Tipperah, Chittagong, and Martaban, it is abundant, and in some at least of these localities a permanent resident, but it does not, I believe, visit the Himalayas anywhere west of Nepal.

I am aware that Dr. Stoliczka says that this species is found in summer on the lower ranges as far as Kotegurh. Year after year I have shot over these lower ranges, and had Shikarees shooting there, while for three years I have had a regular establishment of collectors in the Sutlej Valley, with Kotegurh as their head-quarters, and while I have myself obtained and have had sent to me *T. vitticollis*,—birds, eggs, and nests by the score, I have never even seen a single individual of *T. meena* procured in the localities indicated by Dr. Stoliczka. If it really occurs there, it can only be as an excessively rare straggler, such as *Ectopistes migratorius* is in England. Hutton's bird is beyond doubt *T. vitticollis*. I owe to him both eggs and a specimen of the bird.

T. meena itself includes two races, the one the western form, from Mahableshwur, with the lower tail-coverts light grey; the other, the eastern form, from the east coast of the Bay of Bengal, with these parts deep slaty or dusky bluish. Specimens from the Puchmurries are intermediate, but nearest the Mahableshwur form, while those from Raepore and Comillah are nearest, the latter especially, to the Martaban type.

T. vitticollis lays throughout the summer; I have found eggs early in May and late in August, but the great majority lay in June. It makes a loose, but rather more substantial twig nest than many of its congeners, placed on some horizontal branch of a large tree, usually not far from the extremity. The eggs are pure white, and glossy, and vary from 1·1 to 1·22 in length, and from 0·9 to 0·98 in breadth.

792 (*bis*). **Turtur auritus*** (Ray).

A single specimen of the European Turtle Dove was obtained at Oi Tograk in Yārkand on the 18th of August. Doves were comparatively rare in Yārkand, and this was the

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* *Turtur auritus.*

Dimensions.—Length, 11 to 11·3; expanse, 20 to 21·2; wing, 6·8 to 7·1; tail from vent, 4·75 to 5·25; bill at front, 0·7 to 0·75; from gape, 0·9; tarsus, 0·8 to 0·85; mid toe to root of claw, 0·95; its claw, 0·25; hind toe, 0·4—its claw, 0·23. The second quill is the longest; the first is subequal; the third, 0·2; the fourth, 0·65; the fifth, 1·1 shorter. The second and third quills slightly emarginate on the outer webs towards the tips. Tail rounded; lateral tail-feathers 0·5 to 0·6 shorter than central ones.

Description.—Bill varies from purple to greyish black, according, I think, to season; the tip of the upper mandible slightly yellowish. Orbital space, pale red; irides, orange yellow. Legs and feet, purple to purplish red. Claws, blackish horny.

Plumage.—Top and back of the head and back of the neck brownish ashy, in the female—greyish blue in the male. The back greyish brown often a good deal but faintly tinged towards the tips of the feathers with pale rusty. Lesser and median wing coverts, except just at the carpal joint, scapulars and tertiaries, greyish brown with a large pointed black blotch towards the tips, and broadly margined with light rufous or pale ferruginous; rump and upper tail coverts greyish brown, often more or less tinged, but faintly so towards the tips with dull ferruginous; central tail feathers are brownish grey for the basal halves, and dull somewhat greyish brown for the terminal halves narrowly tipped paler. The lateral tail feathers are blackish slaty, with the whole exterior web of the outer laterals pure white, and all the laterals broadly tipped with white, those nearest the central ones least broadly so. Feathers about the carpal joint and greater coverts of the secondaries pale bluish grey. Primaries, secondaries, and the greater coverts of the former, dull hair brown more or less tinged with grey and very narrowly margined with brownish or greyish white. The chin, throat and ear-coverts whitish, a large patch on each side of the neck black, each feather with a narrow terminal greyish white or white bar. Front of the neck, breast and sides, light

only species observed. The specimen above referred to was a female, and corresponds with European specimens with which Mr. Hume compared it. [*G. H.*]

802 (*bis*). **Syrrhaptes tibetanus,** Gould.*

No specimens were obtained by the Expedition on the way to Yārkand, but Dr. Cayley shot some in the upper

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vinaceous purple, brightest on the upper portion of the breast. Abdomen and lower tail coverts white. Axillaries, wing lining and flanks greyish blue. Beside the difference remarked on the head, the colours of the female are generally paler and duller. [*A. O. H.*]

* *Syrrhaptes tibetanus*, Gould.

Dimensions.—*Male.*—Length, 19; tail from vent, 8·5; expanse, 30; wing, 10; second primary the longest; first primary, 2·5; third primary, 0·35; fourth primary, 1 shorter. Wings when closed reach to within 4·5 of end of tail; the longest, namely the central tail-feathers exceed shortest by 4·5 to 5. The females are somewhat smaller and have the elongated central tail-feathers considerably less developed.

Description.—Bill and nails bluish horny; soles whitish.

Plumage.—Lores and forehead whitish faintly tinged with buff and dark shafted. Crown, occiput, and nape white, closely and somewhat irregularly but closely barred, with blackish brown chin, throat, cheeks, ear-coverts, sides and front of neck, and a narrow band across the back of the neck (not shown in Gould's figure, but very conspicuous in adult male) bright, buffy yellow in the breeding season; white tinged with the same colour in the winter. Lower part of the back of the neck, upper back and upper breast white slightly tinged vinaceous with close regular narrow transverse blackish brown bars. The whole mantle including the scapulars and tertiaries vinaceous fawn colour brightening to rufous buff along its (the mantle's) exterior margin, with large conspicuous black blotches on the inner webs of the scapulars, and everywhere excessively finely vermiculated with blackish brown, which is scarcely perceptible without close examination except on the upper back and towards the tips of the elongated tertials. The lower back and rump are white, very beautifully vermiculated with dark somewhat greyish brown, upper tail coverts similar, but the ground colour tinged with rufous fawn. Central tail-feathers with the basal portions similar to the upper tail-coverts, but with a slightly more vinaceous tinge and with the elongated attenuated portions which in fine males are 5″ in length, black with a slaty bloom on them. Primaries and their greater coverts black with a slaty bloom on them towards the tips, the hinder ones with a more or less extensive buffy white patch on the inner web at the tip. Secondaries black, but with more or less of the outer webs (less in the earlier—more in the later ones) similar in colour to the tertiaries. Lateral tail-feathers bright rufous buff, tipped with pure white and with several widely separated moderately broad more

Karakāsh valley towards the end of July. It was also noticed at a lake some twenty miles S. W. of Mallik Shāh flying towards the Karakāsh after dusk in flocks of from twelve to twenty.

On the return of the expedition it was very abundant at Chāgra, above the Pángong Lake, flying up and down the stream in huge flocks of several hundred birds, and incessantly calling "Yak, yak." It was very tame, and numbers were shot, and, I regret to say, almost without exception eaten, instead of being preserved This bird is called "Kaling" in Thibet and Ladák. [*G. H.*]

816. **Tetraogallus himalayensis** (Gray).

The only specimen of this species obtained was a young bird received from the Kirghiz Tartars at Kitchik Yilák, near the Sánju pass, over which it is the special prerogative of these semi-savages to carry on their Yaks all merchandize to or from India and Yārkand, the pass not being of a nature to permit horses or camels to cross it fully laden. At the same time the Kirghiz gave the party a young bird of the next species; both species, therefore, occur on the north-western flanks of the Kuen Lun. [*G. H.*]

In the upper Sutlej Valley, Lahul, and Spiti, this species lays in June. The eggs, according to native collectors, are from six to ten in number. In shape they are long nearly perfect ovals, slightly larger, and con-

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or less cuneiform transverse black bars. Lower breast grey, abdomen, sides, flank, vent, tibial and tarsal plumes, and shortest lower tail-coverts white, the leg feathers sometimes slightly tinged with fulvous and with traces of narrow transverse barrings on the tibia.

Female much resembles the male, but differs in the much greater extent of pencilling and barring. The whole mantle and the whole of the breast (not merely the upper breast as in the male) is distinctly and conspicuously lineated with narrow zigzaggy dark brown lines. The mantle of the male is doubtless when closely looked into excessively finely vermiculated with blackish grey or greyish brown, but in the female these markings are very conspicuous, and on the longer scapulars and tertials are broader apart and fully as distinctly marked as those on the upper breast of the male. The linear elongated portion of the central tail feathers in the female does not exceed above three inches in length. The bill too is decidedly smaller. [*A. O. H.*]

siderably less pointed than those of the Monaul. The shell is moderately fine and glossy, showing everywhere minute pitted pores, similar to, but much less marked, than those of the Pea-fowls. The ground is a pale olive brown, which is more or less thinly speckled and spotted, and at times blotched with reddish or purplish brown. In size the eggs vary from 2·5 to 2·75 in length, and from 1·85 to 1·98 in breadth. [*A. O. H.*]

816 (*bis*). **Tetraogallus tibetanus,** Gould.*

This bird was first met with in the Sánju pass in the beginning of August, at an elevation of nearly 17,000 feet.

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* *Tetraogallus tibetanus.*

Dimensions.—*Male.*—Length 20″; wing, 10·15; second primary longest; first primary, 0·1; third primary, 0·25 shorter; expanse, 31·5; wings, when closed, reach to within 3·5 of end of tail; tail from vent, 7; lateral tail feathers, 2·0 shorter than the pair next the centre, which are longest; tarsus, 1·85; mid-toe to root of claw, 1·75; its claws, straight from root to point, 0·45; hind toe, 0·45; its claw, 0·17; bill at front, from edge of cere straight to point, 1·05; from gape, 1·2; height at front, at margin of cere, 0·55; length of cere on culmen, 0·13.

Female.—Length, 18; wing, 9·4; tail from vent, 6·5; tarsus, 1·8; bill at front, from margin of cere straight to point, 1·05.

Description.—*Male.*—Bill orange red, dusky towards the nares; legs and feet coral red.

Female.—Bill orange at tips, blackish towards nares; legs and feet orange red.

Plumage.—Forehead and a broad line from the nostrils through the lores and eyes, and over the ear-coverts, buffy white; rest of the top of head, occiput, nape, cheeks, side of the head and neck, dull bluish grey, very freely and inconspicuously vermiculated with blackish brown, and with specks and spots of fulvous white. Chin, and a broad line down the centre of the throat, slightly fulvous white; a broad irregular band round the base of the neck in front, grey, the feathers vermiculated with dark brown, and spotted with slightly vinaceous fawn; then below this the upper breast, white; then over the middle of the breast a broad irregular band of greyish fawn-coloured feathers, all finely vermiculated with dark grey or blackish brown. I note here that Gould's figure is singularly deficient in failing to show the upper gular band, which is very conspicuous in both sexes—in the fresh bird at any rate.

Below the pectoral band the lower breast and abdomen are white, generally with a faint creamy or vinaceous tinge, each feather laterally margined with black. The vent feathers are fulvous white, the lower tail

Only a single covey was observed there—one was shot and a Falcon flying over frightened the rest, who immediately settled and squatted, so that two of them were caught alive. A month and a half later, on the return journey, they were in thousands at the same place, a continuous stream passing and repassing along the hillside throughout the forenoon just about the snow level. The Kirghiz had numbers of young ones, which their herd boys had caught. Later again, in October, the expedition found them very numerous in the Chang-lá pass, about the snow level. They had been feeding on grain, all picked out of the droppings of cattle and horses. The Kirghiz name for the bird is "Utar." [*G. H.*]

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coverts are mingled black and white, the white being chiefly confined to a broad stripe from the tip running upwards, and narrowing as it approaches the centre of the feather. Flanks and tibial plumes, which are much developed, very pale, vinaceous fawn or white tinged vinaceous, with a central linear or lanceolate linear stripe of blackish grey vermiculations. Base of the neck behind and back very pale gray with a faint pinkish tinge very finely vermiculated with blackish brown, most of the feathers of the upper back tinged towards their margins with a dingy fulvous shade and those of the lower back distinctly margined with pale buff. The rump and upper tail-coverts are very similar to the upper back, except that they are pervaded with a rich vinaceous tinge. Central tail feathers of a nearly uniform dull vinaceous pink, closely and strongly vermiculated with blackish brown. Lateral tail-feathers dull greyish black tipped with pale vinaceous rufous, and more or less variegated with the same colour on the outer webs towards the bases. The lesser wing-coverts resemble the upper back. The scapulars, tertiaries, and the coverts adjoining the scapulars, are also very similar to the upper back, but the ground colour is more buffy, the vermiculations more strongly marked, and the feathers are broadly margined with a somewhat rufous buff. The primaries are pure French grey, the earlier ones narrowly, the later more broadly tipped with white, and more or less finely powdered with the same colour on the margins of the outer webs. The secondaries are somewhat similar but much more broadly tipped with white and have the whole of the outer portions of the outer webs above the tips coarsely speckled and spotted with buffy white. The winglet is a slaty-grey, the feathers more or less finely powdered and some of them margined towards the tips with yellowish white. The female is very similar to the male, but has the head paler, has the whole of the ear-coverts white, the cheeks paler and the black stripes of the abdomen somewhat less conspicuous. [*A. O. H.*]

820 (*bis*). **Caccabis pallescens,** *sp. nov.*

One specimen, a male, killed at Karbu, Ladák, on June the 26th, differs sufficiently from the ordinary Indian type to require special notice.

The whole upper and under surfaces are *far* paler and grayer (the crown, back of the neck, rump, upper tail-coverts and breast most conspicuously so) than those of any of the innumerable specimens shot south of the snowy range that I have ever seen. Structurally the birds agree, except where the bill is concerned, for in the Ladák bird it is slightly more lengthened and compressed than in any of the Indian specimens before me. It measures straight from the forehead to point 0·96, and from anterior margin of nares to point 0·62. In the Indian birds these dimensions may be taken as 0·86, and 0·59. The bill is somewhat more compressed, and the culmen slightly more raised. The difference in colour is *very* marked, and if this difference and that of the bills is *constant*, I should propose the name of *C. pallescens*.

In *C. græca*, the bill is much shorter as it seems to me than in either of the Ladák or Indian birds, the bills of specimens before me measure, from the forehead 0·74, from anterior angle of nares, 0·51.

In colour the Ladák bird somewhat reminds me of the species from Aden, which I have called *C. arenarius*, but this, while much less rufous and generally paler than *C. chukor* and *C. græca*, is not so grey as the Ladák specimen. I am not aware that the Aden bird has ever been discriminated, and I may therefore mention that it is a considerably smaller bird than any of the others. Wing 5·75 against 6·75 in the Indian and Ladák birds. Tarsus 1·4 against 1·7 in the Indian birds (similarly measured); the tarsus too is more slender. Mid toe and claw 1·4 against 1·9 in the Indian. There is a fine specimen of this little Chikore in Colonel Tytler's museum, given him by Bábu Rajendra Mallik, who obtained a number from the captain of some Arab vessel, trading from Aden. This was the first specimen I ever saw, but I have since obtained a similar one direct from Aden.

820 (*ter*). **Caccabis pallidus,** *sp. nov.*

In Yārkand a species of Chikone swarms (wherever the rivers debouch into the plains) over a belt of country some ten or fifteen miles in width. The Yārkandis disdain the use of firearms for the chase of these birds. A party of men mounted on ponies and armed with whips pursue a covey and in a very short time succeed in capturing the whole flock. The Chikone will never rise more than twice, and after that as they run, they are easily overtaken and knocked over with whips. This sport is carried on over the most terribly rough ground in the rocky valleys, but the Yārkand ponies traverse at the top of their speed country, that most men would only crawl over with the utmost caution and deliberation. [*G. H.*]

The Yārkand specimens differ still more from the Indian than does the one procured in Ladák. They are excessively pale, and are overlaid with a desert tint, similar to what is observable in *C. arenarius*, nobis, above referred to. The wing measures from 6·0 to 6·25, the bill at front 0·8, and from the exterior angle of the nares 0·51, it seems very questionable whether all these various nearly allied races deserve specific separation, but if this race is to be separated it may stand as *C. pallidus*. [*A. O. H.*]

829. **Coturnix communis** (Bonnaterre).

One specimen of the common Quail was caught on the 24th September, at the Karatāg lake (13,500 feet) and kept alive for several days. It was the only Quail actually observed during the journey, but though not flushed or bagged they were heard calling in all the fields in Yārkand.

845. **Charadrius longipes,** Temminck.

This species was very abundant in August in the vicinity of Yārkand. The specimens are in nearly full breeding plumage (obtained August 22nd to 28th). They do not differ perceptibly either as to length of tarsus or size from specimens procured in the plains of India during the cold season.

This bird has a perfect string of names amongst the Yārkandis, "*Belina*," "*Karrak*," "*Orgat*," "*Mastiak*," but unless one is well acquainted with a language it is by no means safe to rely on the names furnished by the natives on the spur of the moment.

Of a female the length was 9·5, the expanse 20, the tail from vent 2·5, the foot, greatest length 1, greatest width 1.75, the legs and feet plumbeous, bill dark plumbeous nearly black, irides dark brown. [*G. H.*]

Dr. Jerdon tells us that many breed in India *even* towards the *south*, but I am inclined to think there must be some mistake, and that if they breed in India at all it can *only* be in the south. For years these birds have been watched throughout northern India, by myself and several of my contributors, and we have always found that the birds disappeared entirely during the hot season. The same has been the case in Central India, even down at Raëpore, where they are extraordinarily numerous in the spring; the birds become wild and shy by the 1st of May, and before the month closes have all disappeared. [*A. O. H.*]

847. **Ægialites mongolicus** (Pallas).

This species was first met with on the 19th of July, at the hot springs above Gokra, at an elevation of 16,000 feet. A few were seen on the Salt Plain, on the 29th of July, and after that the birds were found in pairs all along the Karakāsh river. They were not very numerous, but a certain number of pairs were met with each day. All the specimens obtained are in full breeding plumage and correspond well with Middendorf's plate, No. XIX, figures 2 and 3.

Not a single bird was met with on the return journey, in September and the early part of October. Gokra was reached on the 5th of that month, so that ere this the young birds must have been sufficiently advanced to leave along with their parents for our distant Indian coasts.

Of one specimen measured in the flesh it is noted that the length was 8 inches; the expanse 16; the tail from

vent 2; the closed wings reached to the end of the tail; the legs were plumbeous; the toes and bill black. [*G. H.*]

851. **Vanellus cristatus** (Meyer).

Three specimens of this species were obtained in the plains between Kargallik and the city of Yārkand. It seemed very abundant in all marshy places throughout the plains of Yārkand. The Turki name is said to be *Machany*. [*G. H.*]

Dr. Jerdon tells us that this species breeds in the Panjáb, but there again I think there must be some mistake. Throughout the Panjáb up to the *ultima thule* of the Peshāwar and Agrove Valleys this bird has been observed to disappear at the latest, early in May, and I very much doubt its breeding south of the snowy range. [*A. O. H.*]

860. **Strepsilas interpres** (Linn.).

A single pair was obtained; the male near the city of Yārkand on the 2nd of September, and the female at Posgám on the 6th of September. They were in an intermediate stage of plumage, between the summer and winter dress. These birds were probably on their return journey from their northern breeding haunts to the coast of India; it does not appear likely that they can reside for any length of time in a far inland country like Yārkand, devoid of lakes even, a mere plain of sand traversed by narrow vein-like streams, scantily fringed with vegetation.

The Turki name is given as *Yaniocha*. Of the male the measurements are as follows:—length, 9; expanse, 16; tail from vent, 2¼; wings when closed reach to within 0·5 of end of tail; legs, feet, dull red; bill black tinged with red at base; irides dark brown. [*G. H.*]

869. **Gallinago solitaria** (Hodgson).

A single specimen of this fine Snipe was obtained on the 8th of October, at the Chāgra Stream above the Pángong Lake at an altitude of about 15,000 feet.

Of this specimen, a female, my notes are:—length, 12; tail from vent, 3·25; expanse, 20 feet; greatest length,

2·12; wings when closed reach to within 0·25 of end of tail; legs, feet, and bill, ashy with a greenish tinge. I may add, wing, 6·35; tarsus, 1·25; bill at front, 2·65. [*G. H.*]

Specimens from Japan and China though varying slightly in tint and proportions appear to be specifically identical.*

This species is fairly well figured in the Fauna Japonica, save only as regards the legs, which are there shown as pale yellow; this they never are in the fresh bird though in the dried skin they do acquire a yellowish tint. The feet, especially the soles, have a somewhat yellowish tinge although even in the feet (except only the soles) green is the prevailing tint, but the legs, in all the many specimens I have examined in the flesh, have always been a dull green, more or less overlaid with an albescent bloom. [*A. O. H.*]

880. **Philomachus pugnax** (Linn.).

Ruffs and Reeves were very common in the immediate neighbourhood of the city of Yārkand, where also they undoubtedly breed. Numerous specimens obtained between the end of August and the beginning of September ex-

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* While concurring in this point with Prof. Schlegel, I take this opportunity of noticing what, so far as our Indian birds are concerned, is a very grave error of his in regard to a not distantly allied species, *Rhynchæa bengalensis*, Lin. (*R. variegata*, Vieillot, apud Schlegel). He remarks (Mus. P. B. *Scolopaces*, p. 16-17), "Teintes du plumage très differentes suivant l'age mais non pas suivant le sexe." And again "Femelles un peu plus grandes que les mâles mais non pas différentes par les teintes." Now this *may* be true of the Painted Snipe, in all other parts of the world, but in continental India it certainly is not so. I have shot hundreds, and dissected dozens of these birds, and while the young of both sexes and the adult females are alike in the matter of the chestnut of the face and neck, I never obtained a single adult male with the chestnut, nor a single adult female without it, and be it remembered that I have shot these birds repeatedly when they were breeding, dotted about in pairs, and with eggs or young about, and it seems to me, therefore, that so far as the Indian bird is concerned, I cannot possibly be mistaken. Is it at all probable that this species in other parts of the world differs in so far that there the adult female acquires the livery of the male? I confess that I am sceptical on this head and believe the learned author above quoted to have been misled by erroneous records of sex on the tickets of his specimens. [*A. O. H.*]

hibited more or less of the rich colouring of the breeding season, but the males had quite lost their ruffs.

882. **Tringa subarquata** (Gmel.).

This species was common in the marshes in the immediate neighbourhood of Yārkand. Specimens obtained at the close of August were in a transitional stage between the breeding and winter plumage. I measured several in the flesh, which gave the following dimensions for males shot in Yārkand.—Length 8·5 to 8·75; expanse 15·25 to 16·5; tail, 2·25; feet, greatest length, 1·38; greatest breadth, 1·5; wings when closed exceed the tail by 0·25; bill black, legs and feet plumbeous black; irides dark brown. The Turki name of both this species and the Ruff is said to be *Kugnak*, which very probably will turn out to mean "long nose," and to be generally applicable to all Snipes, Snippets, *et id genus omne*. [*G. H.*]

This species is in India at any rate continually confounded with *T. cinclus*, but the latter is with us, an inland bird, rarely found near the sea, whereas the present species, as far as I have been able to ascertain, never occurs in Hindustan except as quite a straggler at a distance of more than from one to two hundred miles from the coast. Dr. Jerdon tells us that this species is common in the north of India generally, whereas neither I myself, nor any of my numerous coadjutors, have ever obtained it in the N. W. Provinces, Oudh, the Central Provinces, Rajputāna or the Panjâb. On the other hand he tells us that *T. cinclus* is a rare visitant to India, whereas it swarms by myriads (I have killed a score at a single shot), during the cold season along the banks of all the large rivers of Upper India, especially where any bed of kunkar, or rock cropping up affords a cluster of stones to scamper about. As regards the difference between the two species, Schlegel says correctly that *T. subarquata* differs in its less rounded, almost square tail, in its longer tarsi, somewhat larger size, more compressed and slender bill, which is also usually longer, and always somewhat curved towards the base, and notably in its breeding plumage, which lacks the black of the breast, it having at

that season the head, neck, and whole lower parts of a more or less uniform brownish red, but he neglects the, to my mind, most characteristic and patent differences, which enable us at once to fix the species of any specimen without comparison, even in winter plumage: viz., that in *T. cinclus* the two central tail feathers have the whole inner webs (and sometimes portions of the outer webs also) blackish brown, and all but the outer upper tail-coverts are blackish, while in *T. subarquata* all the tail feathers are grey with a somewhat greenish gloss, and all the upper tail-coverts are white in winter, or white barred with red and dusky in summer.

In size the Yârkand birds corresponded with European examples, but slightly exceeded the dimensions of others procured in the neighbourhood of Calcutta. I have not enough European specimens to decide whether this difference is constant. [*A. O. H.*]

885. **Tringa Temmincki** (Leisler).

This little Stint appears to be very common in suitable localities in Yârkand, where it probably breeds. [*G. H.*]

Specimens, however, obtained there in August had obviously from the plumage bred *at least* two months prior to that period, so that possibly they breed a good deal further north, and only spend the early autumn in Yârkand *en route* for their cold weather residences in India. Independent of its whiter tail, this species may be at once distinguished from both* *T. minuta* and *T. damacensis* (which have them black) by its olive-yellow legs and feet.

892. **Actitis ochropus** (Linn.).

Common everywhere near water throughout Yârkand. [*G. H.*]

893. **Actitis hypoleucus** (Linn.)

The Common Sandpiper was often seen in May and June in Kashmir (where it breeds in considerable numbers),

* Both these closely-allied species occur in India. [*A. O. H.*]

but was not obtained either in Ladák or Yārkand. However, on the return journey a specimen was procured near the Suket Pass, at a height of 17,000 feet, which is there just below the level of perpetual snow; although the bird was overlooked in Yārkand, it seems probable that this individual was on its way back from that country (or possibly some more northern region) to the plains of India. [*G. H.*]

894. **Totanus glottis** (Linn.).

A single Greenshanks was obtained on the 1st of September close to the city of Yārkand itself. The dimensions in the flesh of the Yārkand bird were, length, 12·5; tail from vent 3·5; expanse 23·5; wings when closed reached to end of tail. The bill was black, and the legs and feet greenish.

A Yārkand Pathan called this species "Taturee," but this is the Indian name for Lapwings, and beyond all question belongs originally to this latter family, the cry of the commonest Indian species of which it closely represents. [*G. H.*]

I cannot find sufficient grounds for separating this single bird from the common Greenshanks, and yet I cannot feel quite satisfied that it is not distinct; it was a male, and is a smaller and altogether darker, and more mottled plumaged individual than I have hitherto seen of *T. glottis*, even in its summer dress. If other similar specimens occur, it might perhaps be necessary to separate them specifically. [*A. O. H.*]

901. **Hydrophasianus sinensis.**

This species was only met with in Kashmir. It was very abundant near Banihál. [*G. H.*]

Does any other bird lay eggs like those of this species? Veritable pegtops without the pegs!—cones slightly obtuse at the point, based upon flattened hemispheroids. In texture the shell is compact and hard, and especially when fresh has a fine gloss. The colour varies much—when quite fresh they are of a perfectly uniform rich, deep bronze colour, sometimes greener, sometimes more rufous; but as incubation proceeds, they very commonly, though not

always, grow paler and paler, until they become a pale, yellowish stone, or, in other cases, pale café-au-lait colour. They vary in length from 1·26 to 1·62, and in breadth from 1·05 to 1·16, but the average of fifty eggs measured was 1·47 by 1·13.

They lay from the middle of June to August; the nest is often a mass of weeds and rushes heaped together in the water in the midst of the thickest grass and rice, and so low that the eggs are half immersed in water. Occasionally the nests are amongst the grass of some little island, and then they are much slighter. At times even when constructed in the water, they are so small as hardly to be able to contain the eggs—little shallow, circular cups of rush and water weed on floating lotus leaves, or tufts of water grass. Dr. Jerdon tells us they lay from four to seven eggs; they *may* in Southern India, but I do not believe it, and in Northern India they *do not!* Out of hundreds of nests that I have seen, I only once found one containing even five eggs. Four is the almost invariable number laid point to point. The apical angle is too great to allow of six or seven being thus laid. You might as well try to get right angles into the centre of a circle.

The eggs of this species really seem to indicate that it is not so closely allied to the Rails and *Parræ* as is generally supposed. How very different are the eggs of its nearest apparent Indian ally, *Metopodius indicus*, which lays, water-hen-like, from eight to ten moderately broad oval eggs, a good deal pointed towards one end, but still manifestly intended to lay anyhow in the nest, and not point to point, like a Plover's, or a Redshanks'.

The eggs closely resemble those of the Australian *Parra gallinacea*, Temm., and when fresh have the most superb lustre of any egg I know, insomuch so that it is difficult to convince people who see them for the first time, that they are not made of agate, or when they feel them for themselves, fancy imitations made in the lacker work in which the natives in some parts of India so greatly excel.

The ground colour of the egg varies much; in some it is a very pale stone brown, in others a rich café-au-lait, in

others a reddish olive brown, and in some a very deep rufous, or even olive brown. The markings are chiefly blackish brown, here and there paling to a deep reddish brown, and they consist almost exclusively of finer or coarser lines, intertwined and entangled, as it were, one within another in inextricable confusion. Here and there a few spots and even blotches are observable, but the general character of the markings is as above described.

Now, if *H. sinensis* and *H. indicus* are so very nearly allied as even Schlegel considers them, is it not extraordinary that their eggs should differ so absolutely in shape, texture, colour, markings, number, and manner of disposition in the nest, and that the former should have a distinct winter plumage, while the latter has none? The two skeletons require careful comparison. I should be inclined to suspect that these two species are derived from very different stocks, although a similarity of external conditions may have led to a similar superficial modification of external forms. Having said so much about *Metopodius indicus*, I may note that its eggs vary in length from 1·35 to 1·55, and in breadth from 0·97 to 1·08, the average of fifty being 1·48 by 1·03, and I add the following remarks by my friend Mr. F. R. Blewett:—

"Breeds from June to about the middle of September. The nest is made of weeds, roughly put together: of various sizes, and from one to near two feet in diameter, it is often made on the water surface, at other times, in any island near to the water's edge. In each situation a sheltered spot is chosen, offering concealment—among thick-growing lotus leaves is a favourite resort.

"This Jacana runs with wonderful facility over the floating weeds, lotus-leaves, &c. It is rather a shy bird, and when alarmed will conceal itself by lying close on the weeds or plants, with its head and neck well stretched out on a level with the body. When it can do so, for more effectual concealment, it will half-sink its body into the water. The bird is likewise an expert diver. The boatmen on the Tabbuhut Lake told me that the bird moults once in each year just before the rains, in April and May." [*A. O. H.*]

903. **Fulica atra** (Linn.).

The Coot was not uncommon in the lakes of Kashmir, where it was breeding in May and June. After the Zoji-lá Pass was crossed it was only again seen in the Indus near Lé. [*G. H.*]

905. **Gallinula chloropus** (Linn.).

The Water-Hen was only met with in Kashmir, where it was very plentiful about all the lakes, in which it was breeding in June. [*G. H.*]

909. **Porzana maruetta** (Briss.).

A single specimen of this species was obtained at the Karatág Lake on the Karakoram, at an elevation of over 16,000 feet; this was on the 24th September, and the bird was probably on its way southwards. It could not possibly have been anything but a casual visitor, as the lake lay in perfectly bare shingle, and there was hardly a vestige of vegetation anywhere about. The bird was easily caught by the hand, and at the same time and place, as already mentioned, a common Quail was captured. This lake lies almost in the most direct route, as the crow flies, between Yārkand plains and Lé, and between the nearest points respectively of the Karakāsh and Shyok. [*G. H.*]

910. **Porzana pygmæa** (Naum.).

A single specimen was obtained near Shāhidulla, in the plains of India. [*G. H.*]

This species breeds with us in July and August in the plains of Upper India, and in June and July in Kashmir, and the valleys in the lower ranges containing suitable rice swamps or marshy pools. It is very common near Syree, below Simla. The full number of eggs is, I believe, eight, as we found the fragments of this number of shells round a nest that had hatched off, but six is the greatest number of eggs that I have ever obtained. The nest is made of rush and weed, completely concealed in water grass, wild rush, and the like, and is usually very little above the water's edge.

The egg of Baillon's Crake is very correctly figured by Mr. Hewitson in the third edition of his "Eggs of British Birds." It is oval, slightly pointed towards one end, the shell of a firm and compact texture, and with a slight gloss. The ground colour is a sort of pale olive stone colour, or very slightly greenish drab, thickly freckled and mottled with faint dusky clouds and streaks, which in all the eggs that I have seen were most densely set towards the large end. The dusky markings in some eggs are a sort of pale sepia, but in others have a distinctly purplish tinge. They appear, however, to be at all times dull, inconspicuous, and ill-defined. They vary in length from 1·1 to 1·22; and in breadth from 0·83 to 0·91.

This bird is about the same size as a Quail, and really looks just like one as it rises amongst the rushes, and takes little short flights over the water, dropping suddenly as if shot. [*A. O. H.*]

920. **Melanopelargus episcopus** (Bodd.).

The species was not seen after leaving the plains of India until the plains of Yārkand were reached, and here it was observed on several occasions, especially in the neighbourhood of the city of Yārkand itself, frequenting marshes in small flocks of five or six in number. No specimen was preserved, but I am certain that the birds were identical with the common Indian species, with which I am familiar. [*G. H.*]

Knowing what a careful and accurate observer Dr. Henderson is, I entertain no doubt that he is correct in this matter; but the fact of this species, hitherto only known from India and Malasia (including Java, Borneo, Celebes) on the one hand, and in Africa from Nubia to Caffraria on the other, turning up in a temperate and comparatively northern locality like Yārkand, is so remarkable that the non-preservation of any specimen is much to be regretted. One thing to be said is that there is absolutely no other known Asiatic species for which it could have been mistaken.

In Upper India this species breeds from the latter end of

June to the end of August, but in Central and Southern India, they sometimes lay as early as March. The nests are placed in large trees, peepul (*Ficus religiosa*), burgot (*Ficus indica*), tamarind, sheeshum (*Dalbergia sissoo*) being I think their favourites. The nests are rarely above from twenty to thirty feet from the ground, and vary from fourteen to twenty inches in diameter, and from 4″ to 8″ in depth. They are densely built of twigs and small branches, and have a considerable central depression, sometimes thinly lined with down and feathers, and sometimes almost filled with straw, leaves, and feathers, in amongst which the eggs are sunk as if packed for travelling. The full number of eggs is four: rarely, three more or less incubated eggs are met with. They vary much in shape, but there are three predominant types. The one a regular somewhat flattened ellipse with perfectly similar obtuse ends; another, a broad oval, pointed and pyriform towards one end, and the third, a long narrow oval, more or less pointed towards both ends.

The shells are dull and without gloss, when perfectly fresh of a faintly bluish white, but becoming stained and soiled as incubation proceeds, so that an egg nearly ready to hatch off is very commonly of a yellowish earthy brown colour throughout. They are quite devoid of any natural markings. Held up against the light the shell of freshly laid eggs is a pale delicate green, while in much incubated eggs it is a dingy yellowish green. The eggs, as might be expected, are usually considerably smaller than those of the common Stork, and average somewhat less than those of the Black Stork. In size they vary from 2·3 to 2·66 in length, and from 1·75 to 1·92 in breadth, but the average of fifty eggs measured was 2·5 by 1·83.

923. **Ardea cinerea**, Linn.

Very common about Srīnagar in Kashmir, where there is a large heronry. [*G. H.*]

The eggs of this species are well known. In the plains of India the birds breed according to season and locality, any time from March to August. [*A. O. H.*]

935. **Ardetta minuta** (Linn.).

The Little Bittern was excessively common in the lakes and marshes of Kashmir, where it was breeding in June. [*G. H.*]

This species is found in many parts of the interior of the Himalayas, where much rice is grown. I have it from Nepāl, and have shot it at Syree, below Simla, in the upper valley of the Biās, in Kulu, and in many similar localities; but always in the neighbourhood of extensive rice cultivation. [*A. O. H.*]

937. **Nycticorax griseus** (Linn.).

Common in the lower valley of Kashmir. [*G. H.*]

The eggs are well known. In the plains of Upper India it only breeds, so far as my experience goes, in August. [*A. O. H.*]

954. **Casarca rutila** (Pallas).

The Brahminy Duck, or Ruddy Shieldrake, was first noticed at the hot springs above Gokra at an elevation of 16,000 feet; there they were seen on small lakes at the Salt plain, and all along the Karakāsh river. The young were at that time (July) scarcely able to fly; when approached, the mother made them all dive by swimming and flapping on to each of them, as soon as it showed itself above the water. The mother also pretended to be wounded, and lay on the water every now and then, with wings spread out as if unable to fly. All along the Karakāsh valley, and also on the high tableland, wherever there was water overhung by cliffs, there numbers of Brahminy Ducks with broods of young ones were seen, and holes in these cliffs plastered over with droppings were pointed out by the Kirghiz as the places in which they had bred. The local name is "ngooroo ngaugpa." To Hindoostan this species is only a winter visitant. [*G. H.*]

961. **Chaulelasmus streperus** (Linn.).

Two Gadwalls were killed on the 31st October, at Gānderbal, Kashmir, and many others were seen at the same

time. They were never previously noticed. This species doubtless goes far north to breed, and is a winter visitant to Kashmir, as well as to the plains of India. [*G. H.*]

964. **Querquedula crecca** (Linn.).

The Common Teal was never seen either on the way to or in Yārkand; the first specimen was met with on the return journey, near the hot springs at Gokra, at an elevation of between 15,000 and 16,000 feet. Later in October they were seen on the Indus, near Lé, and at Kargil, also in Ladák. Probably this species does not breed so far south as Yārkand, and the birds seen on the return journey were doubtless migrating to their winter quarters in Hindostan. [*G. H.*]

969. **Aythya nyroca** (Guldenstadt).

This species was observed in Kashmir (on the lakes in which it breeds) both on the upward and downward journey. [*G. H.*]

I believe that this species breeds in some localities in the plains of India, but I have never succeeded in finding the nest. The only eggs that I have seen were procured in the Wuller Lake, Kashmir, in June. There were six, varying from 1·9 to 2·08 inches in length, and from 1·45 to 1·53 in breadth. They had a faint gloss and were regular ovals of an uniform very pale slightly yellowish green, or greenish white. [*A. O. H.*]

972. **Mergus castor,** Linn.

A young half-fledged Merganser was caught in the Indus near Lé, in July, 1870. It was kept alive for some days. [*G. H.*]

The bird probably breeds in Ladák, both in the valley of the Indus and the Shyok, as it does in almost all our northern Indian rivers, high up in the Himalayas, and more or less near their sources. As the winter comes on, they drop down stream and are to be found, during the cold season, in small parties in almost every large stream that debouches from the Himalayas, just where it leaves the hills. [*A. O. H.*]

975. **Podiceps minor** (Linn.)

Several specimens of the Little Grebe, all in full breeding plumage, were obtained in Kashmir in June, 1870. [*G. H.*]

I am unable to discover any constant difference warranting specific separation between our Indian and the European Little Grebe.

With us this species breeds at very different seasons according to locality. In Kashmir they lay about the middle of May. Throughout the upper Panjáb and the Doáb, they chiefly lay in August and September. In Jhánsi July seems the favourite month, and in the Nielgherries, August. The nests are sometimes fixed to the branches of some water-overhanging tree, a couple of feet above the water, and are then made of twigs, grass, leaves, and weeds, but generally they are mere masses of weeds and rush, founded on some tuft of water-grass, and little if at all above the water level. It is almost impossible to catch the old bird on the nest, and almost as difficult to surprise her so far as to make her leave the eggs uncovered. Almost invariably they are concealed by a layer of fresh wet weed; I doubt whether the birds sit much during the day, as I have watched a pair that had a nest containing five (as it turned out) much incubated eggs, nearly a whole day, and found that they never left the comparatively open water in which they were feeding, for the dense rush in which we found the nest next morning, for more than five minutes at a time. The birds certainly did not see me, as I was completely hidden, and watching them through a pair of binoculars. I suspect that during the day the combined heat of the sun and the fermentation of the weeds is sufficient for incubation, and I have observed that some of the eggs (I presume those first laid), are always much more forward than others. Dr. Jerdon says they lay from five to eight eggs, but I have never seen or heard of any nest containing more than six eggs, and the number is almost invariably five.

The eggs are moderately elongated ovals, much pointed at both ends, though rather more so at one end than the other. The texture is fairly close, but still slightly chalky, and they rarely have more than the faintest gloss. When first laid they are white, faintly tinged with blue or green. In Europe the eggs are said to be *pure* white, but in India all the eggs I have seen had when quite freshly laid a faint bluish green tinge. Owing to the bird's habit of covering the eggs over with wet, muddy water weeds, the eggs become rapidly discoloured, turning green, dingy yellowish brown, and then dark earthy brown, like an old addled vulture's egg, or a hard set Coromandel Shell-eater's.

In length they vary from 1·28 to 1·45, and in breadth from 0·88 to 1·1; but the average of thirty-six eggs measured was 1·35 by 0·98. [*A. O. H.*]

978 (*bis*). **Larus argentatus,*** Gmel.

Two young specimens of this species were obtained early in November in the Wuller Lake, Kashmir. [*G. H.*]

From all that I have heard, I believe that it breeds in this locality. It is, doubtless, a very southern habitat, but I have been assured of the fact by sportsmen who professed to have eaten the eggs, which they said were the size of a goose's.

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* *Larus argentatus.*

DIMENSIONS.—Length, 22 to 26. Wing, 17·5 to 18·5. Tail from vent, 7·5 to 8·5; expanse, 53 to 68. Tarsus, 2·4 to 2·7. (The females are smaller than the males.)

DESCRIPTION.—*Adult.* Bill yellow with a reddish band towards the tip of the lower mandible. Feet, fleshy pink. Claws, blackish horny. Iris, yellowish white.

Plumage.—Head, neck, and upper tail-coverts, chin, throat, breast, and in fact entire lower parts and tail, are white. The head, neck, and sides of the neck faintly streaked with brownish grey in winter, which streaks, however, disappear before they leave us in April. Back and wings pale bluish grey, the latter white near the carpal joint, and, with the exterior six primaries, more or less broadly tipped with greyish black, the first primary almost to its base, the second for about two-thirds of its length, the sixth for only, perhaps, an inch. Both primaries and secondaries are more or less broadly tipped with white. In some specimens the white tippings to the first quill are fully an inch and a half broad, and above

I do not think there is any doubt of the correctness of this identification; similar specimens have often been obtained in the plains of India during the cold season, and have usually been referred to *L. fuscus*, but I have young and adult of *L. argentatus* from both Europe and India (it is very common in winter in the Nagjufgurgh Jeel, near Delhi, along with *Chroicocephalus ichthyactus*, *X. brunneicephala*, and *X. ridibunda*), and I myself have no doubt that immature specimens of this species are what in most cases have done duty in Indian collections for *L. fuscus*, no Indian inland killed specimen of which I have ever yet seen. Dr. Jerdon sent an adult, however, of this species to the Asiatic Society's Museum from the Coromandel coast. I note that with this exception, *L. fuscus*, so far as I know, has never been observed eastwards of the Red Sea, whereas *L. argentatus* has been found in Dauria (Radde), the Lower Amur (Schrenk), Japan and China.

980. **Xema brunneicephala** (Jerdon). (Pl. XXXII.)

The Brown-headed Gull was very abundant in July, at an elevation of about 15,000 feet, in a small stream running down from Chāgra into the Pángong Lake.

The birds were in full breeding plumage, and probably had, or had had, nests in the immediate vicinity. When

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these tippings there is often a spot or band of white on one or both webs in the first and second quills.

Young.—The young vary much according to age; in some the bill is dusky yellow—in others brownish, yellowish at the tip, in others a dingy slate colour, pinkish at the gape and at the base of the lower mandible. The iris varies through every shade from brown to pale yellow.' The feet are much as in the adult, but more livid. The whole head, neck, back scapulars, lesser wing coverts, breast, abdomen, and lower parts generally are greyish white, streaked, spotted, and barred with ashy brown, the throat only being spotless. The primaries are slaty black, narrowly tipped albescent, the secondaries are greyish brown paling towards their bases. The tail is black with a slaty bloom narrowly tipped with white, the feathers more or less variegated with white towards their bases.

Other birds more approach the adult, but have their backs a somewhat darker bluish grey; the tail broadly tipped with dark brown and exhibiting faint traces of other narrow brown bars. Some of the coverts are like the back, but most of the lesser ones are still greyish brown.

XEMA BRUNNEICEPHALA.

the expedition returned in October, the majority had disappeared. On both occasions the birds were busy feeding on fish, with which, unlike the saline lake into which it runs, the stream abounds. [*G. H.*]

This species is only a winter visitant to Hindostan, where it is as common in all large inland pieces of water, at any rate in Upper India, as it is along the coast. At the Sambhur Lake, the water of which is often nearly saturated brine, and where it is difficult to guess what they find to eat, Brown-headed Gulls are seen throughout the cold season in vast numbers; they find the water of the lake, however, too salt to bathe in, or even drink, and all day long a constant succession of them may be seen, visiting one or two tiny fresh-water ponds near the lake for these purposes. The Chāgra stream is the first breeding place of this species to which we have obtained any clue. I cannot find that this species has been observed anywhere west of Sind. In Birma it is common. I have it from China, and it may *possibly* be Middendorf's *L. ridibundus* var. *major* (Vögel p. 214) from Kamschatka. It seems to be the Asiatic representative of the American *L. cirrhocephalus*, Viellot. [*A. O. H.*]

981. **Xema ridibunda** (Linn.).

Thousands of this species were fishing in the Wuller Lake, Kashmir, in November, 1870. [*G. H.*]

The lake was not visited by the expedition on its upward journey, and it is therefore not known whether this species and *L. argentatus* really breed there, but from other information that I have received, I am inclined to believe that they do. [*A. O. H.*]

984. **Hydrochelidon indica** (Stephens).

The Whiskered Tern (*H. leucopareia* Natt., of most European writers) was very common in Kashmir in June. The birds were breeding, and many nests were taken, in a marsh close to Srīnagar, about a mile from the Visitors Reach, and on the opposite side of the river. The nests were made of

green rushes, placed in amongst rushes, reed, and floating weeds, and were very scanty. [*G. H.*]

This species also breeds during the rainy season in the plains of Oudh and the North West Provinces.

I may remark that Dr. Jerdon is mistaken in his statement that Mr. Brookes found this species breeding in large churrs on the Ganges. Mr. Brookes disclaims having ever said anything of the kind; the only species of true Terns that do thus breed are *Seena aurantia*, *Sterna melanogastra* (Temm.), and *Sternula minuta*. Far in the north west, in the rivers of the Panjáb, a few pairs of *Gelochelidon anglica* remain to breed, and on the 28th of April, 1870, I took an egg of this species on a sandbank of the Chenáb, two miles below Wazírábád, and killed the parent bird as she rose from the egg. *H. indica* is essentially a marsh Tern, which, with us, *G. anglica* is not. The former lays in July and August. As a rule their nests are placed towards the centre of some large jheel, where the water is deepest and no rice or rush grows, but where the surface is paved with the broad leaves of the water-lily and the lotus. On these they construct a slight platform of rush and weed, wound round and round in a circular form. Four seems to be the full number. The eggs are moderately broad ovals, a good deal pointed towards one end; the texture is very fine and close, but they have little or no gloss. The ground colour varies; in some it is a rich or pale blue green, in some a pale olive stone colour, in some an olive brown, but most commonly I think a pale clear olive green. The markings, which are generally pretty numerous, consist of streaks, spots, and blotches of more or less intense blackish umber, or reddish brown, and have a number of very pale, greyish, or purplish brown clouds, streaks or spots underlying the primary markings. Some of the eggs have a very Snipe-like character, with large oblique blotches; some have only very small specks or spots, while others remind one much of many types of Plover's eggs. With us they always make their own nests, generally, as already mentioned, on the surface of floating leaves, but sometimes on tufts of water grass; but in Northern Africa I see that Canon

Tristram found a whole colony of them breeding in the deserted nests of the Eared Grebes.

In size the eggs vary from 1·47 to 1·6 in length and from 1·1 to 1·15 in breadth. [*A. O. H.*]

986. **Sterna fluviatilis,** Naum.

The Common Tern was very abundant in August in Yārkand, where it doubtless breeds, as a young bird barely able to fly was caught (on the 22nd August) about ten miles from the city. Other specimens were obtained in July at Lukung, near the Pángong Lake, in which neighbourhood also it probably breeds, as it is also said to do (though I doubt it) in Kashmir. [*G. H.*]

This is a rare species even in Upper India, and I have met with comparatively very few even in the Indus. [*A. O. H.*]

988. **Sternula minuta** (Linn.).

The Lesser Tern is common in Yārkand, where it is called "*Balakchi.*" A young bird, apparently just fledged, was caught in the neighbourhood of the city of Yārkand, on the 26th of August, so that the bird must breed there, as indeed it does on the sandbanks of every large river in the plains of Upper India. [*G. H.*]

The Yārkand specimens agree perfectly with our Indian ones, which, however, appear to me to differ slightly from the only English specimen I have compared them with.

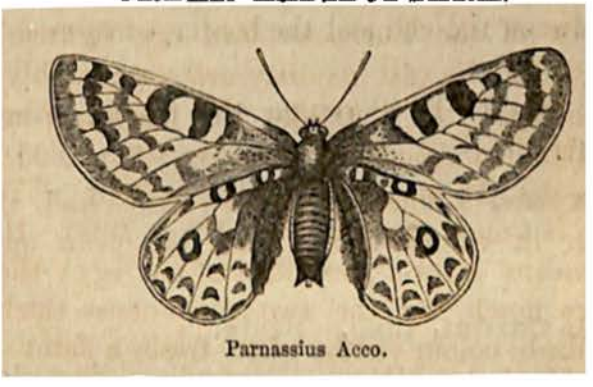
In India this species breeds from the middle of March to the beginning of May, according to locality, those on the south beginning earlier and those in the north later; but whether they are early or late, they always lay later than the other species, *Seena aurantia, Sterna melanogaster, Rhynchops albicollis,* and *Glareola lactea,* all of which commonly breed on identically the same sandbanks. It is needless to say that the eggs, four in number, are laid in a slight depression in the bare sand on some entirely water-surrounded bank in a considerably sized river. Normally the eggs of this species are long ovals, distinctly pointed at

one end. There is a regular gradation in size and shape in the eggs of *T. aurantia*, *S. melanogaster*, and our Indian *S. minuta*. The first are much the largest and roundest, the next are smaller and more oval, the last are the smallest and most elongated of all.

Whether our Indian Lesser Tern be really identical with that of Europe or not (and on this point I am compelled to suspend my opinion) it is certain that not one single egg of the large series that I possess, equals in size the specimen of the European bird egg figured by Mr. Hewitson, whilst the vast majority are considerably smaller. His egg measures 1·33 × 0·96. The largest of more than an hundred Indian specimens measure 1·3 × 0·95. Many of our eggs do not measure more than 1·13 × 0·88, and the average is something less than 1·2 × 0·93. His figure too by no means gives a good idea of our egg; the ground colour varies much, but the two commonest shades are a very pale drab colour (with, when fresh, a faint greenish tinge), and a warm café-au-lait colour. All kinds of intermediate shades, creamy, buffy, and greyish stone-colour occur, but the commonest are those first described. The markings, as is usual on these Terns, consist of streaks, blotches, and spots of different shades of deep brown, with underlying clouds and spots of faint inky purple. As a rule the markings in this species are, I think, bolder, larger, and more streaky than those of the eggs of *S. melanogaster*, which though the egg itself is larger, are smaller and more niggling. The eggs as a rule are entirely destitute of gloss.

CHAPTER II.—INSECTS.

ORDER LEPIDOPTERA.



Parnassius Acco.

Parnassius Acco, G. R. Gray, Cat. Lep. Brit. Mus., p. 76, pl. xii., f. 5. 6.—Lupsang : alt. 17,537 feet. Also on the summit of a pass (July 20th, 1870), 19,690 feet above the sea level, and no vegetation within ten miles.

Mesapia Shawii, n. sp.

Alba, squamulis fuscis sparsim irrorata ; alis anticis macula rotundata apud finem cellulæ, fascia curvata ultra cellulam, maculisque triangularibus marginalibus. Infrà eadem, sed alis posticis fusco crebre irroratis et fascia curvata maculari ultra cellulam. Expans. alar., 1½ in.

Wings very similar in form to *Mesapia Peloria,* Hewits. (Exot. Butt. Pieris, f. 15, 16). Neuration also the same, with the exception that the second branch of the subcostal is emitted *long after* the end of the cell. The antennæ, which are very much longer than in *Parnassius,* have a very long and broad club, more than one-third the total length of the antennæ. The palpi are greatly elongated, and clothed with very long hair scales. The wings are dusky-white, the duskiness being caused by small scattered blackish scales, which are most numerous on the under

surface of the hind wings. On the anterior pair the base, a rounded black spot at the end of the cell, a thick curved fascia extending from the costa nearly to the hind margin, and a triangular spot at the end of each nervule on the outer border, are black. The hind pair have the base and a line at the end of the cell black, and there is a faint trace of the curved dusky fascia of the under surface. Beneath the markings of the anterior wings are similar to the upper surface, but the under wings have a curved fascia, half-way between the cell and the border, composed of dusky lunules.

Taken by Mr. R. B. Shaw, on the Chang Lang Pass: alt. 18,000 ft.

Colias Hyale, Linn.—Smaller in size, and the hind wings clearer in colour above, than European specimens. Yārkand.

Pyrameis Cardui, Linn.—Sánju.

Neorina Shadula, Moore.—Proceedings Zool. Soc. 1872. Sháhidulla.

Mr. Shaw also captured several species of moths, mostly obscure, which have not yet been determined.

Although the insects taken by Dr. Henderson and Mr. Shaw were so few in number, they are extremely interesting, and show what might have been done in this department, if their other duties had permitted them to devote more time to entomology. The occurrence at the northern foot of the Kuen Lun of the Pyrameis Cardui, the familiar "painted lady" of British collectors, is not at all surprising, as the species is of almost universal distribution; being found throughout Europe and Asia, in Northern and Southern Africa, Java, Australia, and North America. Colias Hyale is found throughout Europe and Northern Asia, and its occurrence as a local variety in the neighbourhood of Yārkand is what might have been expected. Neorina Shadula is interesting as being a representative of a genus (large and handsome Bombycidæ moths) the only other species of which occurs near Simla. The other two species are remarkable for the great elevation at which they were

found, the highest yet recorded for the flight of butterflies. Both the genera (*Parnassius* and *Mesapia*) are exclusively confined to mountain ranges and to the Northern Hemisphere; *Parnassius* occurring (not lower than 1000 ft.) in the Pyrenees, the Alps, the Carpathians, the Ural, the Altai, and the mountains of East Siberia, Kamtschatka, and Japan, and the Himalaya, and in the Sierra Nevada and Rocky Mountains of North America; and *Mesapia* being peculiar, so far as at present known, to Western Thibet. The geographical distribution of the species of Parnassius, of which twenty-five are known, is peculiar in so far as, although the insects are never seen in the plains between the mountain groups, the species are not strictly local in their range: thus Parnassius Apollo, common in the Alps, occurs again on the Altai; the same may be said of *P. Phœbus*, and the common species of the Sierra Nevada of California (*C. clodius*) can scarcely be considered as more than a slight local variety of a species of Middle Siberia (*C. clarius*). The numerous species of the Himalaya, however, are all peculiar to this mountain system, and are distinguished from their northern allies by the larger amount of coloration in their wings. The Himalayan species appear to have their distinct zones of elevation. The one which descends lowest into the plains is *P. Hardwickii*, sent not uncommonly in collections from Simla. *P. Jacquemontii* appears to range rather higher up the southern slopes of the Himalaya. Three others—*P. Charltonius*, *P. Simo*, and *P. Acco*—have only as yet been recorded from the highest elevations, having been discovered by Major Charlton at heights varying from 15,000 to 16,000 feet in Western Thibet, and one of them again met with by Dr. Henderson from 17,000 to 19,690 feet of elevation. There can be little doubt that the food-plant of their caterpillars grows also in the same zone as the perfect insects.

H. W. Bates.

CHAPTER III.

LIST OF PLANTS FOUND IN TIBET AND YARKAND DURING THE EXPEDITION OF 1870.

*Those found in Yārkand are marked with an *.*

RANUNCULACEÆ.

* 1. **Clematis orientalis,** Linn.—Common in Ladák from 9 to 14,000 feet. Also in Yārkand along the Karakásh valley from 11 to 14,000 feet, where it usually had a very peculiar habit, being often a very low rounded bush with the flowers on long erect peduncles; this alteration in habit is probably owing to the plants being cut down by the Kirghiz or eaten down by their yaks every season wherever the Kirghiz or traders encamp.

* 2. **Clematis orientalis,** Linn., var. *acutifolia,* H. f. & T.—This form was common in Yārkand, in the ravines above Sánju, from 7 to 10,000 feet, and was once got, but not in flower, near Mulbek, in Ladák, at about 10,000 feet. In habit it resembles the ordinary form, and the leaves are as in *var. acutifolia,* but in the Yārkand specimens the flowers are very small, the sepals being almost as short as the stamens in some flowers, but in others more than twice as long. North of the Sanju Pass this form only was noticed, whilst the common form was only met with in the Karakásh Valley.

3. **Thalictrum Chelidonii,** DC.—Zoji-lá Pass, 10,000 ft.

4. **Thalictrum minus,** Linn.—Very abundant in Ladák from 9 to 12,000 ft.

5. **Adonis pyrenaica,** DC.—Drās Valley (near Zoji-là Pass), 9 to 10,000 ft.

6. **Ranunculus aquatilis,** Linn., var.—Drās Valley, 8 to 9000 ft.

* 7. **Ranunculus cæspitosus,** Wall. — Ladák, 9 to 12,000 ft. Common.

Ranunculus cæspitosus? Wall.—A fragment, with a few leaves but no flowers, was got on September 23rd, at Malik Shah, south of Suket Pass. Altitude 15,000 ft.

8. **Ranunculus Cymbalaria,** Pursh.—Ladák, 10 to 12,000 ft.

9. **Ranunculus lætus,** Wall.—Drās Valley, near Zojilà Pass, 9 to 10,000 ft.

10. **Ranunculus lobatus,** Jacq.—Ladák, at 15,000 ft.

11. **Ranunculus pulchellus,** C. A. Meyer.—Ladák, 9 to 14,000 ft.

* 12. **Nigella sativa,** Linn.—Only once obtained in oases in the desert where there is cultivation, near Kostak, and in Yārkand plains. 6000 ft.

13. **Aquilegia vulgaris,** Linn. — Abundant on both sides of Zoji-là Pass and below Lama Yuru, 9 to 10,000 ft.

* 14. **Delphinium Brunonianum,** Edgew. — Karakash Valley, Yārkand, 15,000 ft. One specimen from Dr. Cayley.

BERBERIDEÆ.

15. **Berberis vulgaris,** Linn.—What appears to be a variety of this was got near Kargil in Ladák, 8 to 9000 ft. Several varieties were common in Kashmir up to 9000 ft.

* 16. **Berberis ulicina,** H. f. & T.—Common in Yārkand, from 9 to 13,000 ft.

17. **Podophyllum Emodi,** Wall.—Zoji-lá Pass, 9 to 10,000 ft.

PAPAVERACEÆ.

* 18. **Papaver,** sp.?—Not in flower. Yārkand plains at Bora, 5000 ft.

FUMARIACEÆ.

19. **Corydalis flabellata?** Edgew.—Indus Valley, Ladák, 10,000 ft.

20. **Corydalis Gortschakovii,** Schrenk. — Gokra, 16,000 ft.

* 21. **Corydalis tibetica,** H. f. & T.—Only met with

just beyond the Karakoram watershed on the desert plains wherever there was a little shelter and moisture; on Lingzi Thang, and at Lak Zung, at 17,000 ft.

22. **Hypecoum leptocarpum,** H. f. & T. — Chimré Valley, Ladák, 12,000 ft.

CRUCIFERÆ.

23. **Matthiola odoratissima,** Br.—Near Lé, in Ladák, 11,000 ft.

24. **Barbarea vulgaris,** Br.—About Drās, 10,000 ft.

25. **Arabis alpina,** Linn.—Both sides of Zoji-là Pass, 9 to 10,000 ft.

26. **Arabis tibetica,** H. f. & T. — Foot of Chang-là Pass, Ladák, 13,000 ft.

27. **Draba alpina,** Linn.—Chang-là Pass, Ladák, 14,000 ft.

28. **Draba alpina,** var. *setosa,* Royle.—This has yellow flowers, but otherwise much resembles the preceding, which has white flowers. Masimik Pass, 16,000 ft.

29. **Draba lasiophylla,** Royle.—Chang-là Pass, Ladák, 14,000 ft.

30. **Draba persica,** Boiss.—In the same localities as the three preceding.

31. **Cochlearia scapiflora,** H. f. & T. — Masimik Pass, 16,000 ft.

32. **Sisymbrium humile,** C. A. Meyer.—Chang-là Pass, Ladák, 14 to 15,000 ft.

33. **Erysimum strictum,** Gærtner. — Drās Valley, 9 to 10,000 ft.

* 34. **Christolea crassifolia,** Camb.—This was very common and in great abundance in Ladák and Yārkand, and at all altitudes between 9 and 15,000 ft.

* 35. **Braya uniflora,** H. f. & T.—On desert plains, near Tarldat, where a little moisture existed. Also on the Sanju Pass; in both places at an altitude of about 16,000 ft.

36. **Braya alpina,** H. & S.—Drās Valley, 9 to 10,000 ft.

* 37. **Brassica campestris,** Linn. — Ladák and Yārkand, under 12,000 feet. As a weed in waste places

about roadsides, but always an escape from cultivation, as the turnip is cultivated pretty generally in these regions.

* 38. **Brassica oleracea,** L.—A great variety of the cabbage tribe is cultivated in Yārkand.

* 39. **Brassica juncea,** Linn.—Common on Yārkand plains, 4 to 6000 ft.

40. **Capsella elliptica,** C. A. Meyer.—Below Pángong lake, 13 to 14,000 ft.

* 41. **Lepidium Draba,** Linn.—Yārkand plains at Oi Tograk, 6500 ft.

* 42. **Lepidium latifolium,** Linn.—This was first got near Drās, and was afterwards met with almost every *day* under 13,000 ft. up to the city of Yārkand, where it was common.

* 43. **Lepidium ruderale,** Linn.—Kashmir and Ladák up to 13,000, and in Yārkand from 6 to 8000 ft.

* 44. **Dilophia salsa,** Thoms.—Karakash Valley, 11 to 14,000 ft.

* 45. **Isatis tinctoria,** Linn.—Arpalak river, Yārkand, 8000 ft.

* 46. **Raphanus,** sp.—In Yārkand plains, also in Kashmir and Ladák. As radishes are cultivated in both countries, the wild plants got along the roads were probably escapes from cultivation.

CAPPARIDACEÆ.

47. **Capparis spinosa,** Linn.—Common along the Indus Valley about Lé, growing in very dry situations. Ladák, 9 to 12,000 *feet.* In Ladák this plant has glabrous leaves, but in the Panjáb, about Multan, and on the Salt Range, has usually downy leaves.

VIOLACEÆ.

48. **Viola cinerea,** Boiss.—Only got on Chang-lá Pass, 13 to 14,000 feet.

CARYOPHYLLACEÆ.

49. **Dianthus crinitus,** Sm.—Mulbek; Ladák, 10,000 ft.

50. **Silene conoidea,** Linn.—In the same locality as the preceding.

51. **Silene affghanica,** Rohrb.—Drās Valley, 9000 ft.

52. **Silene Moorcroftiana,** Wall. — Chang-lá Pass, 16,000 feet.

* 53. **Lychnis apetala,** Linn. — Lak Zung, 17,000 feet, very stunted; and on Sanju Pass up to 15,000.

54. **Stellaria,** sp., near *S. crispata,* Wall. — Common through Ladák, from 9 to 13,000 feet; also found in Kashmir.

55. **Stellaria media,** Linn.—Tanksé, Ladák. 13,000 ft.

56. **Arenaria Griffithsii,** Boiss.—Drās Valley. 9000 ft.

57. **Arenaria,** sp., near *A. Griffithsii,* Boiss.—Zoji-lá Pass, 10,000 ft.

* 58. **Arenaria musciformis,** Wall.—This, which looks like an enormous moss, grows in dense hemispherical masses, which are often several feet in diameter and a foot high; it was found on all the passes in Ladák and Yārkand from 15 to 17,000 ft. It is often the only fuel obtainable in these high regions. It is usually found in ravines and not in open situations.

* 59. **Arenaria,** sp.?—Not in flower. In the most desert parts of the Upper Karakásh Valley, and on the Sánju Pass, 15 to 16,000 feet. It looks like a young state of *A. musciformis.*

PORTULACACEÆ.

* 60. **Montia fontana,** L. — At borders of Yārkand plains, 5000 ft.

TAMARICACEÆ.

* 61. **Tamarix gallica,** Linn.—Ladák, 10 to 12,000 ft., or perhaps higher, and abundant in Yārkand from 4 to 9000 ft.

* 62. **Myricaria germanica,** Desf.—Common in almost every valley from Kashmir to Yārkand from 8 to 4000 ft. up to about 15,000 ft.; it formed a large bush, and in some cases almost a tree, with a decayed, gnarled stem.

* 63. **Myricaria prostrata,** H. f. & T.—Found above 16,000 ft. both in Ladák and Yārkand.

* 64. **Myricaria elegans**, Royle.—This was common throughout Yārkand from 4 to 12,000 ft. It was also common about Drās. This and the preceding species, wherever found, are usually in great quantity, and make excellent fuel; but, with the exception of the camel, our baggage animals did not eat the leaves until very hard pressed by hunger. It is called Umboo in Yārkand.

65. † **Hololachne Shawiana**, Hook. f. (*sp. nov.*).—Foliis lineari-oblongis obtuse apiculatis, petalis spathulato-oblongis, staminibus 10, ovario subsessile, stylis 3.

Hab. Yarkand, one of the commonest plants at elevations of 5 to 12,000 feet.

Truncus prostratus, lignosus, e basi ramosissimus, ramis divaricatis prostratis v. erectis rigidis, ramulis 2-3-pollicaribus strictis virgatis elongato-subulatis teretibus albis sub lente minutissime puberulis. Folia sparsa, $\frac{1}{12}$-$\frac{1}{8}$ poll. longa, lineari-oblonga, abrupte acuminata v. obtuse mucronata, supra plana, subtus convexa, dorso basi breviter producta, viridia, glaberrima, axillis sæpissime gemmiferis. Flores solitarii, ad apices ramulorum v. gemmarum sessiles, $\frac{1}{4}$ poll. diam., albi, 2-bracteati, bracteis parvis calyci adnatis bracteolis obtusis. Calyx campanulatus, ad medium 5 lobus, lobis ovato-lanceolatis subacutis, marginibus membranaceis, corolla dimidio brevioribus. Petala oblongo-spathulata, apice rotundata, recurva, dextrorsum v. sinistrorsum contorta, disco 2-lamellato, lamellis longitudinalibus lamina petali dimidio brevioribus, intus (costam versus) petalo adnatis, margine exteriore et apice rotundatis liberis et erosis. Stamina 10, filamentis filiformibus apices versus attenuatis; antheræ breves. Ovarium subsessile, ellipsoideum; styli 3, cylindracco-subulati, recurvi, apicibus acutis intus stigmatoris; ovula pauca, basi columnæ axilis inserta, cum septis 3 incompletis, alternatia, angusta, cylindracea, sessilia. Capsula $\frac{1}{4}$ poll. longa, ellipsoidea, perianthio emarcido duplo longior, teres, stylis persistentibus terminata, 1-locularis, septis 3 lineribus membranaceis ab axi solutis, ad basin loculicide 3-valvis, valvis cymbiformibus, oligosperma. Se-

† Description by Dr. J. D. Hooker.

mina sessilia, anguste obovoidea, acuta, basi attenuata, longe sericea, testa membranacea, albumine carnosa; embryo majusculus, pyriformis, cotyledonibus plano-convexis obtusis, radicula breviuscula obtusa.

Very closely allied to the original *H. soongarica*, Ehrenberg, which extends across Central Asia from Soongaria to Mongholia, inhabiting saline districts, according nearly with it in habit and general appearance, but differing in the shorter leaves, much larger fewer flowers, longer narrow sepals, and broader petals with larger adnate lamellæ. These lamellæ, which equally exist in *H. soongarica*, have hitherto been overlooked by authors; they, however, reduce the technical difference between *Hololachne* and *Reaumuria* to little more than the more numerous stamens and styles of the latter. The mature seeds and embryo which are hitherto undescribed, agree with those of *Reaumuria*.

Explanation of plate:—Fig. 1, leaf; 2 and 3, flowers; 4, petal; 5, stamen; 6, ovary; 7, seed; 8, do. cut vertically—*all magnified.*

Hololachne Shawiana is a low bush with woody gnarled stems, found in the Karakásh Valley from Shâhidulla to foot of Sánju Pass, and again in the valley leading down to Sánju, and on the Arpalak River, and in the desert between Sánju and Kurgullik, at altitudes from 5000 to 19,000 ft.

MALVACEÆ.

* 66. **Althæa rosea,** Linn. — Common about villages in Yārkand plains, 4000 ft.; probably not indigenous.

* 67. **Malva sylvestris,** Linn.—Very abundant about villages in Yārkand, and probably not wild; 4 to 6000 ft.

* 68. **Abutilon indicum,** L. — Very common about cultivated places, and on roadsides on the plains of Yārkand; 4 to 7000 ft.

69. **Hibiscus Trionum,** Linn.—Very abundant on the Yārkand plains under 6000 ft.

* 70. **Gossypium herbaceum,** L.—Cotton very much resembling the plant grown in India is grown in Yārkand under 6000 feet. The plants have a very stunted habit,

being seldom above eighteen inches or two feet high, but bearing enormous quantities of pods with a much longer and softer fibre than Indian cotton. The mass of the people in Yārkand (including the Kirghiz) who live in the hills dress in cotton clothing, dyed blue or of a dull red colour usually, and the whole of this cotton is, I believe, grown in the country. A "choga" (dressing-gown) made of Yārkand grown cotton, and padded with cotton wool, costs six shillings in the Bazaar at Yārkand, and many of our Indian servants provided themselves with these on account of their cheapness and good quality. Cotton is very little grown in Kashmir, and none is grown in Ládak.

LINEÆ.

* 71. **Linum usitatissimum,** Linn. — Grown to a small extent both in Kashmir and on the plains of Yārkand, but only for its seed, I believe.

72. **Linum Stocksianum,** Boiss.—Drās Valley, 9000 ft.

ZYGOPHYLLACEÆ.

* 73. **Tribulus terrestris,** Linn.—Near Pángong Lake at 14,000 ft., and common on Yārkand plains. The seeds are sold in Yārkand as a medicine, just as they are in India.

* 74. **Nitraria Schoberi,** Linn.—Common in Yārkand under 12,000 ft.

* 75. **Zygophyllum Fabago,** Linn. — Common on Yārkand plains under 8000 ft.

GERANIACEÆ.

76. **Geranium collinum,** A. DC.—In Ladák, 9000 ft.

* 77. **Impatiens Balsamina,** L. — Commonly cultivated for ornament in Yārkand towns.

RUTACEÆ.

* 78. **Peganum Harmala,** Linn. — Common in the

desert in the Yārkand plains under 6000 ft.; the fruit and leaves are larger and coarser than in Panjáb specimens.

SIMARUBEÆ.

* 79. **Ailanthus glandulosa,** Desf. — This was seen between Posgam and Yangi Bázár. The specimens collected have no flowers or fruit, but there is little doubt as to the correct identification; the trees were twenty to thirty feet high.

AMPELIDEÆ.

* 80. **Vitis vinifera,** Linn.—Grapes of excellent quality are grown extensively in Yārkand, but not for making wine. In Ladák I got large bunches of black seedless grapes the size of the Zanté currant, but usually with one or two large grapes with seeds on each bunch. They were said to come from Skardo and to be exported in the dried state to Simla and the Panjáb in large quantities.

LEGUMINOSÆ.

81. **Trigonella corniculata,** Linn.—Drās.

* 82. **Trigonella Fœnum-græcum,** Linn. — Cultivated in Yārkand.

* 83. **Medicago lupulina,** Linn. — Yārkand Plains, and in Kashmir up to 7000 feet.

* 84. **Medicago sativa,** Linn.—Cultivated in Ladák up to 11,000 ft., and also about the city of Yārkand, where it forms the principal fodder for horses.

* 85. **Melilotus alba,** Lam.—Yārkand Plains, 5000 ft.

* 86. **Melilotus officinalis,** Linn.—In Ladák up to 11,000 ft., and in Yārkand under 6000 ft.

* 87. **Trifolium repens.** Linn.—Yārkand city.

* 88. **Sphærophysa salsula,** DC. — Only got once near the city of Yārkand.

* 89. **Colutea arborescens,** Lindl. — Common along roadsides within twenty miles of Yārkand city.

* 90. **Caragana versicolor,** Royle. — Yārkand plains in deserts.

91. **Calophaca (Chesneya) cuneata,** Benth. — Drās Valley, 9000 ft.

92. **Astragalus ciceriformis,** Royle.

* 93. **Astragalus multiceps,** Wall.

The two last resemble each other very closely; specimens from Kashmir and Ladák seem to agree with the latter, and specimens from the Karakásh Valley, near Sháhidulla, seem to be the former species, if indeed they are distinct and not mere varieties. They were found at from 10 to 13,000 ft.

94. **Astragalus subulatus,** M. B. — Drās Valley, 9000 ft.

95. **Astragalus pedunculatis,** Royle.—Drās Valley, under 9000 ft.

96. **Astragalus ciliolatus,** Benth.—Found in the same localities as the two preceding.

97. **Astragalus Munroi,** Benth.—This beautiful Astragalus was twice met with in Ladák at an altitude of 9000 ft., growing on dry gravelly slopes.

98. **Astragalus tibetanus,** Benth.—Drās Valley and Kashmir.

99. **Astragalus hypoglottis,** Linn.—About the Pángong Lake and in the Karakásh Valley from 11 to 12,000 ft.

* 100. **Astragalus strictus,** Grah.—Foot of Chang-lá Pass, 13,000 ft., and in Karakásh Valley, 11 to 13,000 ft.

101. **Astragalus rhizanthus,** Royle.—Drās Valley and Kashmir, about 9000 ft.

* 102. **Astragalus densiflorus,** K. & K.—Karakásh Valley, 11 to 12,000 ft.; very common.

103. **Astragalus confertus,** Benth.—Ladák, 12 to 15,000 ft.

* 104. **Astragalus,** sp.—A solitary specimen; Karakásh Valley, 15,000 ft.

* 105. **Oxytropis macrophylla,** DC. — Common everywhere in Ladák and Yārkand from about 14 to above 17,000 ft. It was one of the few plants met with at Lak Zung and Tarldat, and the roots make very good fuel, as they often grow to a large size, and become quite woody, although there may be only a few stunted leaves and flowers to be seen above ground.

* 106. **Oxytropis tatarica,** Camb.—Ladák and Yārkand, from 14 to 16,000 ft.

* 107. **Oxytropis diffusa,** Led.—Common on Yārkand plains, 4 to 6000 ft., near streams and cultivation.

* 108. **Glycyrrhiza glandulifera,** M. B. — Very abundant at every oasis in the desert between Sanju and Yārkand city, and forming, with *Tamarix* and *Myricaria,* the mass of the jungle along the Yārkand River.

* 109. **Alhagi Maurorum,** Linn.— Common on Yārkand plains, near streams and irrigated fields, everywhere under 7000 ft.

* 110. **Cicer arietinum,** Linn. — This is not extensively grown in Yārkand, but is of a very superior sort, the seeds being perfectly white.

111. **Cicer soongaricum,** DC.—Ladák, 9 to 13,000 ft.

112. **Lathyrus sativus,** Linn.—Ladák, in fields.

* 113. **Vicia Faba,** Linn. — Ladák and Yārkand, cult.

* 114. **Pisum sativum,** Linn.—Both beans and peas are cultivated in Ladák up to 10,000 ft., and also in Yārkand below 8000 ft.

* 115. **Phaseolus Mungo,** Linn. — Cultivated about Yārkand. Many species of *Phaseolus* are grown in gardens.

* 116. **Sophora alopecuroides,** Linn. — One of the most common weeds on the Yārkand plains under 8000 ft.; only found near streams. No animal appears to eat it.

* 117. **Soja hispida,** Mœnch. — Cultivated about Yārkand.

ROSACEÆ.

* 118. **Persica vulgaris,** L.—Peaches and nectarines, which seemed to us quite equal to the best English ones, were very abundant in Yārkand city.

* 119. **Armeniaca vulgaris,** Lam.—Apricots are cultivated in Kashmir, Ladák, and Yārkand. In some parts of Ladák they must be very abundant, for the dried fruit forms an important article of food, and is exported in considerable quantities to the Panjáb. The dried fruit,

powdered, and looking like a coarse brown flour, is sometimes mixed with tea.

* 120. **Prunus Puddum,** Wall. — Several varieties are cultivated in Yārkand, and the fruit is of excellent quality. Cherries were not seen in Yārkand.

* 121. **Potentilla fruticosa,** Linn. — Found in the Karakásh Valley, about 14,000 ft.

122. **Potentilla bifurca,** Linn.—Drās Valley, 9000 ft.; and near Pángong Lake, 14,000 ft.

123. **Potentilla pseudo-anserina,** Bert. — Tanksé Valley, 13,000 ft.

* 124. **Potentilla sericea,** Linn. — Chang-lá Pass, 15,000 ft. A very stunted variety of this was got at Lak Zung, near a small streamlet, about 19,000 ft.

* 125. **Potentilla multifida,** Linn.—Ladák and Yārkand, in Karakásh Valley, and ravine above Sánju, about 12,000 ft.

126. **Potentilla,** sp.—About Mulbek in Ladák.

127. **Chamærhodos sabulosa,** Led.—Near hot springs above Gokra, over 16,000 ft.

128. **Rosa eglanteria,** Wall.—This beautiful yellow rose with double flowers is very common, and undoubtedly quite wild along the valley above Kargil in Ladák.

* 129. **Rosa Webbiana,** Wall. — Was got near the foot of the Sánju Pass in the Karakásh Valley, and also north of the Sánju Pass, from 8 to 10,000 ft.

130. **Rosa cinnamomea,** Linn. — Chimré, Ladák, 12,000 ft.

* 131. **Rosa,** sp.—A little like *R. Brunonis;* was got at Sánju and Yārkand Plains.

* 132. **Pyrus communis,** Linn.

* 133. **Pyrus Malus,** Linn.

Excellent pears and apples were got in Yārkand, superior I think to those of Kashmir. Apples are grown in Ladák, but I have never seen pears there. Quinces were not seen in Yārkand, neither the fruit nor the trees.

134. **Cotoneaster,** sp.—Was seen below Drās, but the specimens have been lost.

SAXIFRAGACEÆ.

* 135. **Saxifraga palpebrata,** H. f. & T.—On Sánju pass, above Kirghiz encampment.

* 136. **Parnassia maisorensis,** Heyne. — Karakásh Valley at 12,000 ft.

137. **Ribes leptostachyum,** Dne.—Very common in lower parts of the Drās Valley.

CRASSULACEÆ.

* 138. **Sedum Tibeticum?** H. f. & T. — Was found from the Zoji-lá pass to the Sánju pass, at altitudes from 11 to 17,000 ft.; it was one of the few plants found on the high table land about Lak Zung.

* 139. **Sedum Stracheyi?** H. f. & T.—Found in precisely the same localities as the last. I have put a "?" to both, as in certain stages of growth, and when not carefully preserved, there is difficulty in distinguishing different species of Sedum; the former species drops most of its leaves in drying, the latter does not do so usually.

140. **Sedum pauciflorum,** Edgew.—On Zoji-lá Pass only.

141. **Sedum,** sp. (near *S. Rhodiola*).—Chang-lá Pass, Ladák.

142. **Sedum Rhodiola,** Linn.—Above Drās.

HALORAGEÆ.

* 143. **Hippuris vulgaris,** Linn.—In Ladák, 9000 ft. up to 14,000 ft., near the Pángong Lake; also got at Yārkand city.

ONAGRARIEÆ.

144. **Epilobium,** sp.—Drās.

CUCURBITACEÆ.

* 145. **Momordica Charantia,** L. — Yārkand Plains, near cultivation.

A great variety of Cucurbitaceæ is grown in Yārkand. Water-melons, melons, cucumbers, and gourds of every description are grown for the table, and the rind of a large gourd which often grows into very extraordinary shapes is used for carrying water, for stems of hookahs, &c. It is generally grown on trellises in front of houses, and in the large towns on beams placed across the streets.

UMBELLIFERÆ.

146. **Vacatia cerisifolia,** Wall.—Lama Yuru, Ladák.

147. **Bupleurum tenue,** Ham.—Lama Yuru, Ladák.

148. **Carum Carvi,** Linn. — About villages in Ladák (to 12,000 ft.).

149. **Chærophyllum,** sp. = 5 H. f. and T. dist.—Zoji-lá Pass.

150. **Chærophyllum villosum,** Wall. — Drās Valley, and ravine below Lama Yuru, Ladák.

* 151. **Seseli sibiricum,** Benth., or a nearly allied species.—Karakash Valley, and ravine north of Sanjú Pass about 12,000 ft.

* 152. **Seseli** (Cnidium) **diffusum,** DC. (Athamanta diffusa, Wall.).—Karakash Valley: about 12,000 ft.

153. **Prangos pabularia,** Lindl. — This is found in very great abundance above Drās, and in October it, as well as almost every green thing, is cut down and stored as winter fodder. I do not think that animals readily eat it in the fresh state; in the winter they are so pressed by hunger in these regions that they will probably eat anything. The plant grows to four feet high, and even more, and in many places near Drās forms the bulk of the herbage. The plant was also found on the south side of Banihál Pass and in the Sind Valley. The native name is Premgos.

* 154. **Ligusticum,** sp. = 1 Oreocome, H. f. and T. dist.—Sanjú Pass, 14,000 ft.

* 155. **Pleurospermum,** sp. = 9 Hymenolæna, H. f. and T. dist.—Mallik Sháh, in desert plains; 16,000 ft.

156. **Ferula,** sp. = 3 Dorema, H. f. and T. dist.—One if

not two species of Ferula was common in Kashmir, and was noted above Drās, but no specimens were brought from the latter locality. The plant has a strong smell of assafœtida, but I am not aware that any assafœtida is prepared either in Ladák or Kashmir.

* 157. **Anethum graveolens,** Linn.—Cultivated on plains of Yârkand.

158. **Heracleum,** sp.—Near Pángong Lake, 14,000 ft.

159. **Heracleum,** sp.—14 H. f. and T. dist.—Drās, Chang-lá Pass, and Pángong Lake, 9 to 14,000 ft.

160. **Heracleum,** sp.=2 Pastinaca, H. f. and T. dist.—Drās Valley, 9000 ft.

* 161. **Coriandrum sativum,** Linn. — Cultivated about Yārkand.

* 162. **Daucus Carota,** Linn.—Carrots are largely cultivated in Yârkand, and are much superior in flavour to any I have ever seen in the Panjáb.

CAPRIFOLIACEÆ.

163. **Lonicera asperifolia,** H. f. & T.—Drās Valley.

164. **Lonicera obovata,** Royle.—Ravine above Sanjú, 10 to 11,000 ft.

165. **Lonicera microphylla,** Willd. — Ravine below Pángong Lake, 13 to 14,000 ft.

166. **Lonicera glauca,** H. f. & T.—Drās Valley.

167. **Lonicera myrtillus,** H. f. & T.—Valleys in Ladák.

CAMPANULACEÆ.

168. **Codonopsis ovata,** Benth.—Mulbék Valley, Ladák.

169. **Campanula cristata,** Wall.—Chimré, 12,000 ft.

RUBIACEÆ.

* 170. **Galium rotundifolium,** Linn.—Yārkand City.

171. **Galium verum,** Linn.—Drās Valley and Kashmir.

* 172. **Galium,** sp.—Yārkand, 12,000 ft.

173. **Galium tricorne,** Linn.—Indus Valley, near Lé.

CAPRIFOLIACEÆ.

W.H.Fitch del et lith.

J.N.Fitch imp

Iphiona radiata, *Benth.*

L.Reeve & Cº London.

COMPOSITÆ.

174. **Tussilago Farfara,** Linn.—Common in Kashmir and Ladák up to 1100 ft.

175. **Aster alpinus,** Linn.—Ladák and Yārkand, 13 to 17,000 ft. This was one of the few plants got on the Lingzi Thang plains, but only in places where there was moisture and shelter.

176. **Aster** (Diplopappus), sp. = Sp. H. f. and T. dist.—Chang-lá Pass, Ladák.

* 177. **Callistephus chinensis,** Nees.—China asters in great variety are the most favourite flowers in Yārkand gardens.

178. **Erigeron acris,** Linn.—Kashmir and Ladák up to 13,000 ft.

179. **Erigeron,** sp.—Diplopappus, H. f. & T.—Drās.

* 180. **Karelinia Caspia,** Less.—Yārkand City.

181. **Inula,** sp. = H. f. and T. dist.—Ladák, 9 to 10,000 ft.

* 182. **Inula,** sp.—About Yārkand City.

** 183. **Iphonia** (Vartheimia) **radiata,** Benth., sp. nov.—Herbacea v. suffruticosa, ramosissima, foliis parvis sessilibus ovato-lanceolatis, basi dilatatis cordatisque margine revolutis subtus canohirsutis capitulis radiatis ad apices ramorum solitariis breviter pedunculatis, pappi setis exterioribus brevioribus perpaucis.

Caules ½-1-pedales, duri, fere e basi ramosissimi, adscendentes v. erecti, pilis longiusculis conspersi v. fere glabri. Folia numerosa, patentissima, sparsa, crassiuscula, obtusissima, 1-2 lin. longa v. rarius longiora, summa in pedunculo minima distantia. Involucrum campanulatum, circa 4 lin. longum, bracteis pluriseriatim imbricatis oblongis obtusis siccis subcoloratisque (flavicantibus) intimis angustis subscariosis, exterioribus gradatim brevioribus. Receptaculum planum v. vix convexum, nudum, scrobiculatum. Flores radii 1-seriati haud numerosi, disci numerosi, omnes ut videtur fertiles. Corollæ flavæ, glabræ, radii tubo longo gracili, ligula patente 2 lin. longa apice 3-dentata, disci tubu-

losæ, involucro longiores, superne parum latiores, apice breviter 5-fidæ. Antherarum tubus apice exsertus, auriculis baseos liberis tenuissimis in setas capilliformes parce ramosas desinentibus. Styli florum disci longiusculi, lineares, leviter complanati, obtusi, exappendiculati; minutissime papillosi. Achænia parva, angusta, obtuse 5-angulata, parce papillosa. Pappi setæ albidæ, tenuissime capillares at rigidulæ, copiosæ, sub-2-seriatæ, exterioribus perpaucis brevioribus.

This differs from the other species of the genus in its radiate capitula. It belongs to the section *Vartheimia*, distinguished by the suffrutescent rather than shrubby habit, and by the outer setæ of the pappus not much shorter than the others, or only a very few more shortened. The involucre is very different from that of *Inula*.

Common on Yārkand plains, on roadsides, and in waste places.

Explanation of Plate.—Fig. 1, ray-floret; fig. 2, summit of its style; fig. 3, disk floret; fig. 4, one of its stamens; fig. 5, summit of its style; fig. 6, achæne; fig. 7, a seta of the pappus.

* 184. **Xanthium spinosum,** Linn.—Common near cultivation on the plains of Yārkand.

* 185. **Tagetes erecta,** Linn.

* 186. **Tagetes patula,** Linn.—These two are cultivated on house-tops and village gardens everywhere in Yārkand, also in Ladák.

* 187. **Cremanthodium,** gen. nov. Benth. MSS. in Kew Herb. = Ligularia, sp. H. f. and T. dist.—Chang-lá Pass, Ladák, 17,000 ft.

188. **Senecio laciniosus,** Wall.—Kashmir and Drās.

* 189. **Senecio pedunculatus,** Edgew.—Throughout Ladák and in the plains of Yārkand.

* 190. **Calendula officinalis,** Linn.—Marygolds are common in Yārkand gardens and in Ladák.

191. **Anaphalis** (Antennaria) **contorta,** DC.—Kashmir and Drās.

* 192. **Leontopodium alpinum,** Linn.—Common in Ladák and Yārkand at altitudes between 14 and 16,000 ft.

[illegible] involucro longiores, superne parum latiores, a [illegible] Antherarum tubus apice exsertus, auri[illegible] liberis tenuissimis in setas capilliformes parce [illegible] desinentibus. Styli florum disci longiusculi, line[illegible] [illegible] complanati, obtusi, exappendiculati; minutis[illegible] papillosi. Achænia parva, angusta, obtuse 5-angulata, p[illegible] papillosa. Pappi setæ albidæ, tenuissime capillares at[illegible] [illegible], copiosæ, sub-2-seriatæ, exterioribus perpaucis brev[illegible] [illegible].

This differs from th[illegible] species of the genus i[illegible] radiate capitula. It belongs to the section *Varthei* distinguished by [illegible] suffrutescent rather than shrubby h[illegible] and by the outer se[illegible] the pappus not much shorter [illegible] the others, or only a very few more shortened. The [illegible] lucre is very different from that of *Inula*.

Common on Yārkand plains, on roadsides, and in v[illegible] places.

Explanation of Plate.—Fig. 1, ray floret; fig. 2, sum[illegible] [illegible] its style; fig. 3, disk floret; fig. 4, one of its stam[illegible] [illegible] summit of its style; fig. 6, achæne; fig. 7, a se[illegible] [illegible] pappus.

184. **Xanthium spinosum**, Linn.—Common [illegible] on the plains of Yārkand.

185. **Tagetes erecta**, Linn.

186. **Tagetes patula**, Linn.—These two are c[illegible] [illegible] house-tops and village gardens everywher[illegible] [illegible] Ladák.

187. **[illegible]odium**, gen. nov. Benth. MSS. in [illegible] Herb. [illegible] Lichnaria sp. H. f. and T. dist.—Chang-lá [illegible] Ladák, 17,000 ft.

188. **Senecio laciniosus**, Wall.—Kashmir and Dr[illegible]

189. **Senecio pedunculatus**, Edgew.—Throug[illegible] [illegible] and in the plains of Yārkand.

190. **Calendula officinalis**, Linn.—Marygolds [illegible] common in Yārkand gardens and in Ladák.

191. **Anaphalis** (Antennaria) **contorta**, DC.—Kas[illegible] and Dra[illegible]

192. **Leontopodium alpinum**, Linn.—Common

W.H.Fitch. del. et lith.

J.N.Fitch imp.

Saussurea ovata, *Benth.*

L Reeve & C° London

* 193. **Pyrethrum pyrethroides,** H. f. & T.—Common in Ladák and Yārkand, 8 to 12,000 ft.

* 194. **Artemisia Absinthium ?** Linn. — Yārkand desert plains, 16 to 17,000 ft.

* 195. **Artemisia annua,** Linn. — Common about the city of Yārkand.

* 196. **Artemisia Dracunculus,** Linn.—Ladák and Yārkand, 13,000 ft.

197. **Artemisia maritima,** Linn. — Very common in Ladák, from 9 to 12,000 ft.

* 198. **Artemisia stricta,** Edgew.—Common in Ladák and Yārkand, from 6 to 17,000 ft.

199. **Artemisia laciniata,** Willd.—Drās and Tanksé Valley.

* 200. **Artemisia vulgaris,** Linn.—Yārkand plains, 6 to 7000 ft.; also in Kashmir.

* 201. **Artemisia tibetica,** H. f. & T.—Common in Ladák and Yārkand, from 15 to 18,000 ft.

* 202. **Artemisia Sieversiana,** Willd. — Ladák and Yārkand, 12 to 17,000 ft.

* 203. **Artemisia fasciculata,** Fisch.— Ladák and Yārkand, 9 to 16,000 ft.; very widely distributed.

204. **Echinops,** sp.=sp. from W. Tibet, H. f. & T.— Very common in Ladák; the dried leaves are used for making tinder; it is called *Ak Zéma.*

205. **Echinops niveus,** DC.—Drās. Not nearly so common as the preceding.

* 206. **Saussurea,** sp.=sp. from Tibet, H. f. & T. dist.—Ladák and Yārkand, 16 to 17,000 ft.

** 207. **Saussurea ovata,** Benth., sp. nov.—Humilis, foliis longe petiolatis late ovatis grosse argute dentatis, capitulis dense corymboso-glomeratis, involucri bracteis apice villosis intimis obtusis exterioribus latioribus acuminatis, receptaculo nudo, antherarum setis basilaribus distinctis ciliato-ramosis.

Caules in speciminibus suppetentibus simplices, 3-5-pollicares. Folia pauca, petiolo ½-1 pollicari anguste alato, lamina abrupte dilatata crassiuscula 1-1½ pollicari; folia etiam floralia adsunt pauca, sub capitulorum glomerulo sessilia, lanceolata.

Capitula in glomerulo 4-6, magnitudine eorum *S. alpinæ*. Involucri bracteæ variabiles, interiores nonnullæ v. plurimæ angustæ obtusæque, exteriores paucæ v. plurimæ latæ subherbaceæ breviter v. longe acuminatæ. Pappus *S. alpinæ*, setis exterioribus brevibus sæpius paucis, interioribus longis copiose longeque plumosis.

Near Sanjú Pass, Yārkand, 12 to 14,000 ft.

Explanation of Plate.—Fig. 1, floret; fig. 2, stamen; fig. 3, seta of the pappus.

* 208. **Saussurea andryaloides,** H. f. & T. — Only got at Lak Zung and Tarldat, 17,000 ft.

* 209. **Saussurea,** sp.=sp. from Nubra, H. f. and T. dist.—Lak Zung, Tarldat, and on entering the Karakash Valley; 15 to 17,000 ft.

* 210. **Saussurea sarcocephala,** Schrenk.—Gnischu, Lingzi Thang, Lak Zung, and Tarldat, confined to high desert plains; 16 to 18,000 ft.

* 211. **Lappa major,** DC. — Only once got on Yārkand plains, near Sanjú, 8000 ft.

* 212. **Centaurea** (Acroptilon) **Picris,** C.A.M.—In waste places near cultivation between Sanjú and Yārkand, 4 to 8000 ft.

* 213. **Carduus nutans,** Linn.—Common in Ladák and Yārkand, from 4000 to 12,000 ft. Very generally distributed.

* 214. **Carduus arvensis,** Linn.—Found in the same localities as the preceding.

215. **Scorzonera divaricata,** Turcz.—Drās.

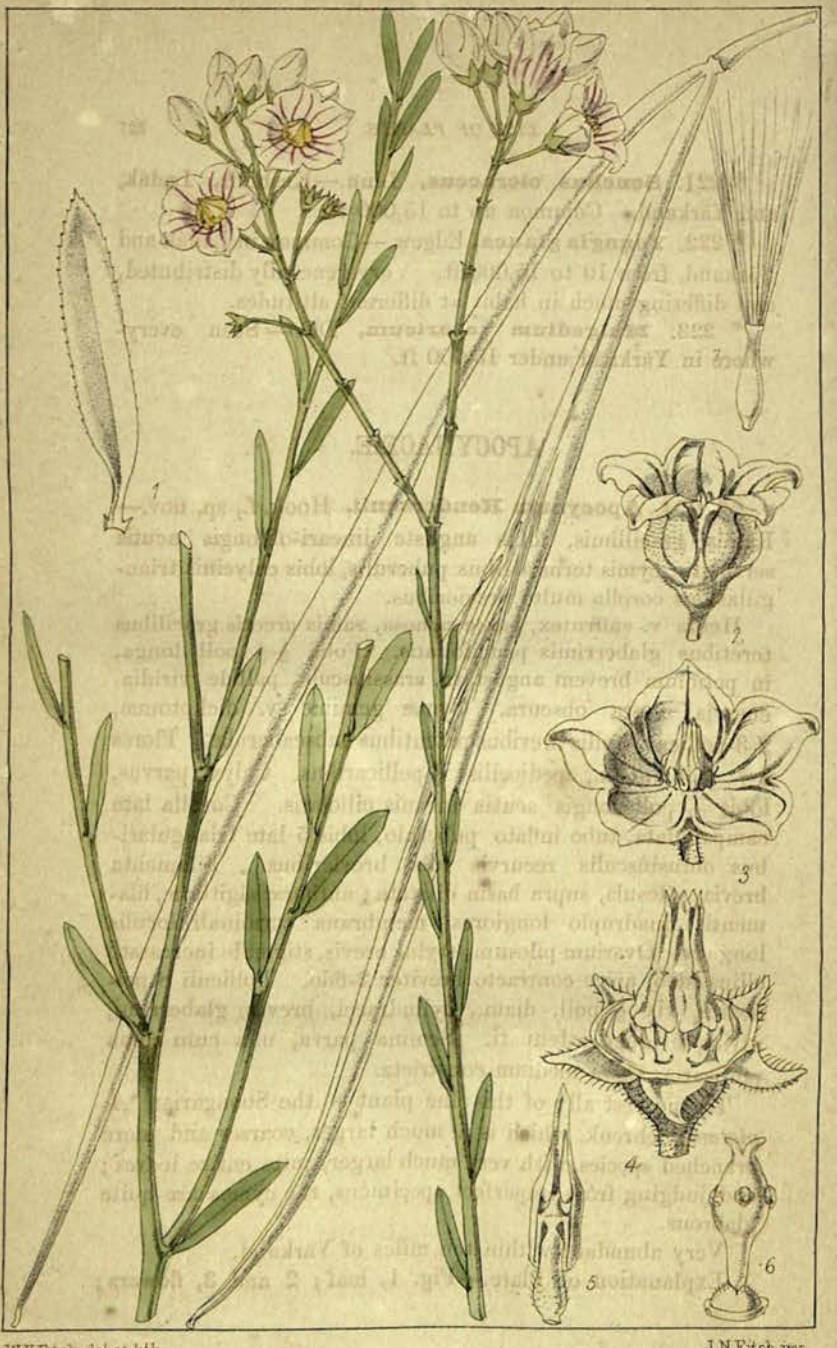
* 216. **Lactuca sativa,** Linn.—Both wild (?) and cultivated in Kashmir, Ladák, and Yārkand.

* 217. **Lactuca longifolia,** DC.—Common in Ladák and Yārkand, from 4 to 14,000 ft.

* 218. **Taraxacum officinale,** Linn.—Common from Kashmir to Yārkand City, up to 16,000 ft.

* 219. **Chondrilla juncea,** Linn.—Near Sanjú, Yārkand plains.

* 220. **Sonchus spinosus,** DC.—Common on Yārkand plains, in the desert; 4 to 7000 ft.



W.H.Fitch del. et lith.

J.N.Fitch imp.

Apocynum Hendersonii, *Hook. f.*

L. Reeve & Co. London.

* 221. **Sonchus oleraceus,** Linn.—Kashmir, Ladák, and Yārkand. Common up to 15,000 ft.

* 222. **Youngia glauca,** Edgew.—Common in Ladák and Yārkand, from 10 to 15,000 ft. Very generally distributed, and differing much in habit at different altitudes.

* 223. **Mulgedium tataricum,** DC.—Seen everywhere in Yārkand under 15,000 ft.

APOCYNACEÆ.

** 224. **Apocynum Hendersonii,** Hook. f., sp. nov.—Ramis gracillimis, foliis anguste lineari-oblongis acutis serrulatis, cymis terminalibus puberulis, lobis calycinis triangularibus corolla multo brevioribus.

Herba v. suffrutex, parce ramosa, ramis erectis gracilibus teretibus glaberrimis paucifoliatis. Folia ½-⅔ poll. longa, in petiolum brevem augustata, crassiuscula, pallide viridia, enervia, costa obscura. Cymæ geminæ v. dichotomæ, 2-3-pollicares, pilis brevibus patentibus subscaberulæ. Flores ½-¾ poll. diam., pedicellis ½-pollicaribus. Calyx parvus, lobis $\frac{1}{12}$ poll. longis acutis incanis ciliolatis. Corolla late campanulata, tubo inflato puberulo, lobis 5 late triangularibus obtusiúsculis recurvis tubo brevioribus. Filamenta brevia, pilosula, supra basin dilatata; antheræ sagittatæ, filamentis quadruplo longiores, membrana terminali loculis longiore. Ovarium pilosum; stylus brevis, stigmate incrassato ellipsoideo, apice contracto breviter 2-fido. Folliculi 8-pollicares, vix ⅓ poll. diam., cylindracei, breves, glaberrimi, utrinque longe attenuati. Semina parva, una cum coma pollicaris, supra medium constricta.

The nearest ally of this fine plant is the Soongarian *A. pictum*, Schrenk, which is a much larger, coarser and more branched species, with very much larger, quite entire leaves; and judging from imperfect specimens, the cymes are quite glabrous.

Very abundant within ten miles of Yārkand.

Explanation of Plate.—Fig. 1, leaf; 2 and 3, flowers;

4, the same with the corolla removed; 5, stamen; 6, pistil; 7, seed:—*all magnified.*

ASCLEPIADACEÆ.

* 225. **Cynanchum,** sp. = sp. 3, H. f. and T. dist.—This varies extremely. It was met with all through Ladák and Yārkand, from 4 to 12,000 ft.

226. **Vincetoxicum,** sp. = sp. 7, H. f. and T. dist.—Ladák.

GENTIANEÆ.

* 227. **Gentiana tenella,** Fries.—Only got on the Sanjú Pass in Yārkand, at 15,000 ft.

228. **Gentiana marginata,** Griseb.—Above Drās.

CONVOLVULACEÆ.

* 229. **Convolvulus arvensis,** Linn.—A common weed the whole way from Lahore to Yārkand, at altitudes under 7000 ft. in Kashmir up to 11,000 ft. in Ladák, and from 4000 ft. to 7000 ft. in Yārkand.

* 230. **Cuscuta planiflora?** Ten. — Very common about Yārkand; usually parasitic on Alhagi Maurorum. There is one specimen of this in the Kew Herbarium, obtained by Edgeworth at Multan on lucern said to be raised from seed brought from Yārkand.

BORAGINEÆ.

231. **Echinospermum barbatum,** Led.—Sakté, Ladák; 13,000 ft.

232. **Omphalodes,** sp. = sp. 4, H. f. & T. dist.—Locality not noted.

233. **Omphalodes?** sp.—Drās.

234. **Omphalodes micrantha,** DC.—Drās Valley.

235. **Macrotomia endochroma,** H. f. & T.—Drās.

236. **Solenanthus circinatus,** K. & K.—Drās Valley.

237. **Solenanthus,** sp. = 2 Echinospermum, Strachey and Winterbottom dist.—Ladák, 10 to 12,000 ft.

* 238. **Arnebia hispidissima,** D.C.—Ladák, 10 to 16,000 ft.; and a variety with blue flowers and less hispid, in the Karakash Valley, 14,000 ft. = 7 H. f. and T. dist.

239. **Arnebia euchromon,** Royle. — Chang-lá Pass, Ladak; 13,000 ft.

240. **Eritichium longifolium?** Dun.—Drās Valley.

241. **Cynoglossum denticulatum,** A. DC. — Drās Valley.

242. **ynoglossum anchusoides,** Lindl.—Drās Valley.

SOLANACEÆ.

243. **Physalis Alkekengi,** Linn.—Gathered at Burgo, in Ladák, but it was probably cultivated.

* 244. **Solanum nigrum,** Linn.—Common in Yārkand, from 4 to 9000 ft.; always with red instead of black fruit. The leaves of this plant are commonly used as greens by the natives of the Panjáb.

* 245. **Solanum Melongena,** Linn. — Cultivated in Yārkand and Kashmir, but I never saw it in Ladák.

* 246. **Lycium tataricum,** Pall. — A common bush in Yārkand; from 4 to 11,000 ft. This is one of the few desert plants found between Sanjú and Yārkand.

247. **Hyoscyamus pusillus,** Linn. — Ladák; 9 to 10,000 ft.

* 248. **Scopolia prealta,** Dun. — Very common as a weed of cultivation in Ladák, up to 15,000 ft. It is said to poison horses and cattle.

* 249. **Capsicum frutescens,** Linn. — Cultivated about Yārkand.

* 250. **Nicotiana Tabacum,** Linn.—Largely cultivated about Yārkand, where I also noticed N. rustica, but did not get a specimen of the latter. I have seen tobacco growing at Drās, but it is seldom cultivated at Ladák.

PLANTAGINEÆ.

* 251. **Plantago major,** Linn. — Common about Yārkand.

252. **Plantago,** sp. = Stewart's No. 409K in Kew Herbarium. Ladák, 10,000 ft.

253. **Plantago tibetica,** H. f. & T. — Drās and Chimré.

SCROPHULARINEÆ.

* 254. **Dodartia orientalis,** Linn.—This is a common bush in the desert between Sanjú and Yārkand.

* 255. **Gymnandra,** sp. innom.—Karakash Valley, 14,000 ft. The specimens in the Kew Herbarium were got by Dr. Thomson on the Karakoram.

256. **Lancea tibetica,** H. f. & T.—Common in Ladák, 10 to 12,000 ft.

257. **Veronica Anagallis,** Linn.

258. **Veronica Beccabunga,** Linn. — These two Veronicas are common along the Indus Valley in Ladák.

259. **Scrophularia scabiosæfolia,** Benth. — Drās Valley, 9000 ft.

260. **Scrophularia Kotschyi,** Boiss. — Ladák, 10 to 16,000 ft.

261. **Scrophularia variegata,** M. B.—Mulbek, Ladák.

262. **Mimulus strictus,** Br.—Indus Valley, Ladák.

263. **Pedicularis abrotanifolia,** Biel.—Chang-lá Pass, 13,000 ft.

* 264. **Pedicularis,** sp. near the preceding. Got north of Sanjú Pass, 9 to 10,000 ft., in Yārkand territory.

265. **Pedicularis versicolor,** Whl.—Zoji-lá Pass.

* 266. **Pedicularis,** sp. near P. labellata, Jacq.—Kitchik Yílák, below Sanjú Pass, Yārkand.

267. **Verbascum Thapsus,** Linn. — Ladák, under 11,000 ft.

268. **Striga euphrasioides,** Benth.—Drās Valley.

OROBANCHACEÆ.

* 269. **Orobanche cœrulescens?** Steph., or possibly **Phelipæa** = Stocks, No. 763, from Belochistan, in Kew Herbarium. This was very abundant in the fields between

Kargallik and Yārkand. The flowers are bright blue, and the stems are white with a bluish tinge; some of the fields were quite covered with this plant.

* 270. **Orobanche,** sp.—Possibly another form of the preceding. Was gathered on the north side of the Sanjú Pass, near the Karakash river, also above Sanjú on the Arpalak river; 9 to 10,000 ft.

* 271. **Orobanche cernua,** Lœffl.—Oi-Tograk on Yārkand plains.

LABIATÆ.

272. **Dracocephalum stamineum,** K. & K.—Changlá and Másinik Passes, Ladák; 15 to 16,000 ft.

* 273. **Dracocephalum fragile,** Turcz.—Got on Changlá Pass, about Pángong Lake, above Hot Springs at Gokra, and in Karakash Valley, on Sanjú Pass, both in Ladák and Yārkand; about 15,000 ft.

274. **Nepeta floccosa,** Benth.—Ladák, 10 to 12,000 ft.

275. **Nepeta salviæfolia,** Royle.—Drās Valley.

276. **Nepeta or Dracocephalum?** sp.—Drās.

277. **Mentha arvensis,** Linn.—Indus Valley, Ladák, and on Yārkand plains beyond Sanjú; 4 to 10,000 ft.

278. **Mentha Royleana,** Benth.—Ladák, 9 to 11,000 ft.

279. **Perowskia abrotanoides,** K.—Common in Ladák. Possibly this is the plant which travellers in Ladák call wild lavender, although *Eurotia* is more usually known by that name.

280. **Salvia compressa,** Vahl.—Indus Valley, Ladák.

281. **Salvia?** sp.—Leaves only; Drās Valley.

282. **Marrubium lanatum,** Benth.—About Gokra, Ladák, 15,000 ft.

283. **Stachys,** sp.=8 H. f. & T. dist.—This is one of the commonest plants in Ladák; it is extremely variable in habit; 9 to 14,000 ft.

PRIMULACEÆ.

* 284. **Androsace Chamæjasme,** Wulf.—Sakté, Ladák, 13,000 ft., and at Lak Zung, 17,000 ft.

* 285. **Androsace villosa,** Linn.—Khush Maidán, on the Karakash river, 16,000 ft.

286. **Androsace sarmentosa,** Wall.—Ladák, 11,000 ft., Manika and Fota-lá Passes.

287. **Androsace aizoon,** Dne.—Drās Valley, 9000 ft.

288. **Androsace Jacquemonti,** Duby.—Lādak, Fota-lá Pass, 10,000 ft.

* 289. **Androsace,** sp.—Yārkand, head of lower Karakash Valley, and Sanjú Pass; 15 to 16,000 ft.

* 290. **Glaux maritima,** Linn.—Ladák and Yārkand, 6000 to 13,000 ft.

* 291. **Primula sibirica,** Jacq.—Near Pángong Lake, and in Karakash Valley; 14,000 ft.

* 292. **Primula purpurea,** Royle. — Zoji-lá Pass, Chang-lá Pass, and in Karakash Valley; 9 to 14,000 ft.

293. **Primula pusilla,** Wall.—Zoji-lá Pass.

294. **Primula denticulata,** Wall., var. *capitata.*—Zoji-lá Pass.

* 295. **Primula,** sp. nov.—This is a very beautiful species, and appears to be new; it was very abundant in the Karakash Valley, from 11 to 14,000 ft.

BALANOPHOREÆ.

* 296. **Cynomorium coccineum,** Linn.—This curious plant, which at first I mistook for a very hard Morel, was abundant at one spot on the banks of the Arpalak river, fifteen miles above Sanjú, where the Yārkand plains begin. At an altitude of about 9000 ft. it was found under a dense thicket of *Myricaria* and *Tamarix,* on the roots of which it was probably parasitic.

PLUMBAGINEÆ.

* 297. **Statice aurea,** Linn.—Very abundant in the Karakash and Arpalak valleys in Yārkand; 9 to 12,000 ft.

298. **Acantholimon tibeticum,** H. f. & T.—Common in Ladák; 10 to 14,000 ft.

POLYGONACEÆ.

299. **Fagopyrum esculentum,** Mœnch. — Buckwheat is common in Ladák as a weed of cultivation, and is said to be used as greens, but I have never seen it cultivated beyond Lahul, where it is a common crop.

* 300. **Calligonum comosum,** Linn. — A common bush on the desert plains in Yārkand, from 5 to 8000 ft.

301. **Rumex acetosa,** Linn.—Kashmir and Drās.

302. **Rumex dentatus?** Linn.—Yārkand City.

303. **Rumex aquaticus,** Linn.—Indus Valley, Ladák.

* 304. **Polygonum orientale,** Linn.—Yārkand City.

* 305. **Polygonum,** sp. = 37 H. f. and T. dist.—Ladák and Yārkand, 14 to 15,000 ft.

* 306. **Polygonum Hydropiper,** Linn.—Yārkand City.

* 307. **Polygonum aviculare,** Linn.—Yārkand City.

308. **Polygonum,** sp. = 2 H. f. and T.—Drās.

* 309. **Polygonum viviparum,** Linn. — Kashmir, Ladák, and Yārkand, up to 12,000 ft.

* 310. **Rheum.**—There are, I think, two species of this, but the specimens are very imperfect. Rhubarb is found in all the passes between the Payat and Yārkand, at altitudes from 12 to 16,000 ft. Usually it is stunted, and I have nowhere seen it in very great quantity.

AMARANTACEÆ.

* 311. **Celosia cristata,** Linn. — Cornfields about Yārkand.

* 312. **Amarantus Blitum,** Linn.—Yārkand.

SALSOLACEÆ.

313. **Camphorosma ruthenicum?** M. B. — Indus Valley, Ladák.

* 314. **Eurotia ceratoides,** C. A. M. — This plant, which is called *Boortsie,* is common everywhere between Ladák and Yārkand, above 14,000 ft.; its roots afford the

dry fuel for days together in crossing the high table land. Yaks readily eat it, but horses and sheep will not do so until hard pressed; the flesh of sheep fed on it is almost uneatable.

* 315. **Halimocnemis,** sp.—Karakash and Yārkand plains, 8 to 14,000 ft.

* 316. **Chenopodium Vulvaria,** Linn.—Sanjú.

* 317. **Chenopodium murale,** Linn. — Sanjú to Yārkand.

* 318. **Chenopodium maritima,** Moq.—Yārkand City.

319. **Echinopsilon mollis,** Bunge. — Indus Valley, Ladák, and between Sanjú and Yārkand.

* 320. **Atriplex rosea?** Linn., H. f. and T. dist.—Lé and Yārkand.

* 321. **Halogiton glomeratum,** C. A. Mey.—Yārkand, at 5 to 15,000 ft.

* 322. **Salsola Kali?** L.—Desert plains between Sanjú and Yārkand.

URTICACEÆ.

* 323. **Ficus,** sp. — In Yārkand several excellent varieties of fig are cultivated. The fruit is very large, and often pure white, as if it had been blanched.

* 324. **Morus.**—Mulberries are cultivated in Yārkand for feeding silkworms. The trees are planted along roadsides and round fields. They are also occasionally seen in Ladák.

325. **Urtica hyperborea,** Jacq.—Below Pángong Lake, 13,000 ft.

CANNABINACEÆ.

* 326. **Cannabis indica,** Lam. — Indian hemp, or rather the extract, is one of the principal exports from Yārkand. The plant grows to 8 or 10 feet in height. I was unable to see the process by which the extract is prepared. I was told that the fibre is seldom extracted, the straw being used only as fuel.

JUGLANDACEÆ.

* 327. **Juglans regia,** Linn.—The Walnut is cultivated in Yārkand, and the trees are often of large size, and fruit very freely. At Sanjú and Kargallik we encamped in groves of Walnut trees. In Ladák there are a few solitary trees planted at villages on the Indus, below Lé. Walnuts are so plentiful in Kashmir that oil is expressed from the kernels.

ELÆAGNACEÆ.

* 328. **Hippophae rhamnoides,** Linn. — Ladák and Yārkand, from 7 to 15,000 ft. At 11,000 ft. it often grows into a good-sized tree, 20 ft. high, but as the altitude above the sea increases it becomes reduced in size, and is often met with only a few inches in height. Called *Sir ma* in Ladák.

329. **Elæagnus angustifolia?** Linn. — Ladák, along the Indus Valley, where it is called *Sir Ling;* the roots are said to be used for making matches for matchlocks.

* 330. **Elæagnus latifolia?** Linn.—This is one of the most common trees in Yārkand, where it is cultivated as a tall hedge, and for its fruit, along roadsides; the fruit is often an inch and a half long. I doubt if it is indigenous in Yārkand, the plants seen, apparently wild, at oases in the desert between Sanjú and Kargallik had much smaller fruit and more spiny branches, but had probably grown from seeds dropped by travellers.

EUPHORBIACEÆ.

331. **Euphorbia Maddenii,** Boiss.—Ladák.

332. **Euphorbia tibetica,** Boiss.—About Tanksé in Ladák.

SALICACEÆ.

* 333. **Populus balsamifera,** Linn.—Common about villages in Ladák up to 13,000 ft., but always cultivated, I

believe; a tree much resembling this is also commonly planted in Yārkand up to 9000 ft. The Turki name of all the Poplars is *Toghrak*. Both the Ladák and Yārkand trees have usually curious globular galls at the bases of many of the leaves.

* 334. **Populus alba,** Linn.—One of the most common cultivated trees in Yārkand, up to 8000 ft.; it is often 15 ft. in girth and of immense height. I never saw it nearly so large in Ladák or Kashmir.

335. **Salix acutifolia,** Willd.—Ladák, up to 14,000 ft.

* 336. **Salix viminalis,** Linn. — Above Sháhidulla, Yārkand.

337. **Salix elegans,** Wall.—Drās Valley, near the snow.

* 338. **Salix pycnostachya?** Anders. — About Bálakchi on the Karakash.

339. **Salix tetrasperma,** Roxb.—Drās Valley and on the ravines above Sanjú, Yārkand.

340. **Salix arbuscula?** Linn.

341. **Salix rubra?** Linn.—These two are common on the north side of the Zoji-lá Pass.

* 342. **Salix angustifolia,** Willd.—In Yārkand, about Sanjú; 8 to 10,000 ft.

THYMELACEÆ.

343. **Thesium multicaule,** Led.—Drās Valley.

BETULACEÆ.

344. **Betula Bhojputra,** Wall. — Common on the Zoji-lá Pass, but not noticed beyond.

GNETACEÆ.

* 345. **Ephedra vulgaris,** Rich.—This is very common throughout Ladák and Yārkand under 16,000 ft. It varies much in appearance in different localities, forming a large bush at 11,000 ft., and on the passes being reduced to half an inch in height. It is not improbable that there are two species, but it is very difficult to distinguish them.

CONIFERÆ.

346. **Juniperus communis,** Linn. — Common in the Drās Valley down to 9000 ft.

347. **Juniperus excelsa,** Wall.—Straggling specimens of this occur as a small shrub along the Drās River and the adjoining valleys, and also along the Indus, but not in any abundance. Twenty miles below Drās there is a clump of trees each about 20 ft. high, and 4 or 5 ft. in girth; and thirty miles west of Lé, at Hemis Shukpa, there is a sacred tope of very ancient trees 30 ft. high, and many of their stems 12 ft. in girth. A large quantity of the timber is brought to Ladák from Zanskar for fuel. The Tibetan name is *Shukpa.*

ALISMACEÆ.

* 348. **Triglochin palustre,** Linn. — Indus Valley, Ladák, 11,000 ft., and in Karakásh Valley, Yārkand, chiefly about salt marshes, 14,000 ft.

* 349. **Triglochin maritimum,** Linn.—Hot springs above Gokra, Ladák, about 16,000 ft.; Karakásh Valley, Yārkand, 13 to 16,000 ft. In most of the localities where it occurred there was much saline matter in the water and soil.

NAIADEÆ.

350. **Potamogeton pectinatus,** Linn.

351. **Potamogeton perfoliatus,** Linn. — Both these are common along the Indus Valley in Ladák. No specimens were obtained in Yārkand.

IRIDEÆ.

352. **Iris Kumaonensis,** Wall.—This is very abundant in Ladák up to at least 12,000 ft. In autumn it is cut and dried like hay, and is stored on the roofs of the houses to feed the cattle in winter. In Kashmir the winter fodder is stored in the forks of trees to allow of its being got at when there is snow on the ground.

353. **Iris fragrans,** Lindl.—Not so common as the last.

LILIACEÆ.

354. **Polygonatum verticillatum,** All.—Drās Valley.

355. **Eremurus spectabilis,** Bieb.—Drās Valley.

356. **Allium odorum?** Linn.—Indus Valley, Ladák.

* 357. **Allium,** sp.—Both sides of Sánju Pass, Yārkand, 14,000 ft.

* 358. **Allium,** sp.—Not in flower; Kargallik on Yārkand Plains, 5000 ft.

* 359. **Allium lineare,** Linn., var. *junceum.*—In great abundance along the Kuen Lun range in the Karakásh Valley, about 14,000 ft., growing in large masses in clefts of rocks. The leaves when boiled are excellent eating, at any rate we relished them very much after a fortnight of desert marching.

360. **Allium nivale?** Jacq.=No. 13 H. f. & T. dist.—Drās Valley.

361. **Allium,** sp.=18 H. f. & T. dist.—Drās Valley.

362. **Lloydia serotina,** Roxb.—Másimik Pass, Ladák, 16,000 ft.

363. **Fritillaria cirrhosa,** Don.—Drās Valley, near Zoji-lá Pass.

MELANTHACEÆ.

364. **Colchicum,** sp.—Zoji-lá Pass.

JUNCACEÆ.

* 365. **Carex Moorcroftii,** Falc.—Common from Chágra to the Karakásh Valley, from 15,000 to 18,000 ft.; sometimes it was met with in patches of several acres, each plant being several feet apart from the adjoining ones. It was almost the only food for the baggage animals for more than a week. It is very locally distributed and is usually found on dry gravel slopes, often at a distance from water.

366. **Carex nivalis,** Boott.—Drās Valley.

* 367. **Carex stenophylla,** Wahl.—Head of Lower Karakásh Valley, 14 to 15,000 ft.

368. **Eleocharis palustris,** Br.—Ladák, up to 15,000 ft.

369. **Eleocharis,** sp.—Indus Valley, Ladák.

370. **Elyna Royleana.**—Ladák, up to 15,000 ft.

371. **Elyna capillifolia,** Dne.—Ladák, up to 13,000 ft.

372. **Elyna schoenoides,** C. A. Mey.—Ladák, up to 14,000 ft.

* 373. **Scirpus lacustris,** Linn.—Common near Yārkand City.

* 374. **Juncus,** sp. = sp. from Jaeschke, in Kew Herbarium.—Ladák and Karakásh Valley.

GRAMINEÆ.

* 375. **Oryza sativa,** Linn.—I am not aware that rice is cultivated anywhere in Ladák, but it is common about Yārkand. Our camp followers were much surprised at seeing both the summer and winter crops of the Punjáb Plains ripening at the same season in Yārkand. Wheat and barley, rice and maize, were being reaped in adjacent fields. I believe the winter in Yārkand is much too severe to allow of a winter crop of any sort.

* 376. **Zea Mays,** Linn.—Indian corn is a common crop on the Yārkand Plains. The flour is said to be mixed with wheat flour to render the bread white, but this grain is chiefly used for feeding horses. It is not grown in Ladák.

* 377. **Oplismenus Crus-galli,** Kunth.—Common about the city of Yārkand.

* 378. **Panicum miliaceum,** Linn.—Cultivated near Yārkand.

* 379. **Setaria glauca,** Beauv.—Yārkand City.

380. **Alopecurus pratensis,** Linn.—Zoji-lá Pass.

381. **Agrostis canina,** Linn.—Ladák.

* 382. **Agrostis,** sp. = sp. H. f. & T. dist.—Karakásh Valley, 15,000 ft.

383. **Deyeuxia anthoxanthoides,** Munro MSS.—Culmis gracilibus lævibus, foliis caulinis 2, lamina vaginæ æquilonga, ligula oblonga lacera, spica capitata, gluma florifera trun-

cata, arista subbasilari basi vix torta glumis vacuis subæquilonga.

Hab. Sánju Pass above Kitchik Yílák, Aug. 1870.

Cæspitosa. Culmi basi decumbentes, 4-10 pollicares, graciles, læves. Folia flaccida, radicalia 3-5 poll. longa, culmo dimidio breviora, angusta, plana, acuminata, superne striolata, subtus scaberula; vaginis lævibus sulcatis vix inflatis; ligula oblonga hyalina obtusa lacera. Spiculæ in capitulum globoso-ovoideum apice rotundatum compactæ, breviter pedicellatæ, $\frac{1}{3}$ poll. longæ, fulvæ, 1-floræ, pedicello glabro fere lævi. Glumæ 2, vacuæ, æquales, lanceolatæ, versus apicem subaristatam serratæ v. erosæ, hyalinæ enerviæ, carina tenui remota scaberula. Gluma florifera hyalina, vacuis triente brevior, lineari-oblonga, truncata, apice sub-5-dentata, 3-nervis, glaberrima, lateribus obscure scaberulis; callo laxe piloso, pilis gluma dimidio brevioribus; arista subbasilaris capillaris, basi vix torta, scaberula, glumis vacuis æquilonga. Palea gluma florifera paulo brevior, lineari-oblonga, truncata, apice erosa, 2-nervis, nervis vix scabris; setula palea $\frac{1}{4}$ brevior, gracilis, parce pilosa. Squamulæ hyalinæ, inæqualiter 3-fidæ. Stamina 3, filamentis brevibus; antheræ lineari-oblongæ, palea triente breviores, aurantiacæ. Ovarium ellipticum; stylis breviusculis per totam longitudinem breviter plumosis.

This very remarkable grass has been carefully examined by General Munro, who points out its similarity to *Calamgrostis holciformis*, Jaub. and Spach. Ill. Pl. Orient. t. 346, a plant of the lofty regions of Tibet, which differs from this in the rigid glaucous scabrid leaves, loose open panicle, the hispid pedicels, scabrous empty glumes, twisted awn, densely bearded callus, and larger and very densely bearded setula at the base of the palea. Its remarkable similarity to *Anthoxanthum* suggested to Gen. Munro the name which is adopted here. There are very obscure traces of 3 nerves at the base of the lower empty glume, and the squamulæ are very variable in size and shape.—*J. D. Hooker.*

Explanation of Plate.—Fig. 1, spikelet; 2, floret; 3, palea and stamens; 4, stamens, squamulæ, and ovary; 5, squamula; 6, ovary:—*all magnified.*

W.H.Fitch del. et lith.

J.N.Fitch imp.

Deyeuxia anthoxanthoides, *Munro*

L. Reeve & Co. London.

* 384. **Calamagrostis laxa,** Host.—Very abundant in Yārkand, from 8000 to 15,000 ft.

* 385. **Arundo madagascarensis,** Kth. — Yārkand Plains, wherever there is water.

386. **Gymnothrix flaccida,** Munro. — Ladák, up to 13,000 ft.

* 387. **Gymnothrix?** sp.—Yārkand Plains.

388. **Stipa sibirica,** Lam.—Drās.

389. **Stipa orientalis,** Trin.—Ladák, up to 12,000 ft.

390. **Poa pratensis,** Linn.—Ladák, 11,000 ft.

* 391. **Poa alpina,** Linn.—Ladák and Yārkand, 9 to 12,000 ft.

* 392. **Poa soongarica,** Pers.—Small tufts of this grass were not uncommon on the Lingzi Thang Plains, far away from any water. It was got at altitudes from 15 to over 18,000 ft.

393. **Melica ciliata,** Linn.—Drās.

394. **Kœleria cristata,** Pers.—Drās Valley.

395. **Festuca duriuscula,** Linn.—Drās Valley.

* 396. **Chloris barbata,** Sw.—Yārkand City.

397. **Bromus japonicus,** Thb.—Ladák, up to 12,000 ft.

* 398. **Polypogon monspeliensis,** Linn.—Ladák and Yārkand Plains.

399. **Triticum repens,** Linn.—Drās.

* 400. **Triticum vulgare,** Vill.—Wheat of several varieties, and of very superior quality, is the principal crop on the plains of Yārkand. The bread, which is very white, is in unleavened cakes, usually over a foot in diameter. Biscuits are also made, and keep good for six months.

* 401. **Arundinella nipalensis,** Trin. — Yārkand Plains.

* 402. **Elymus dasystachys,** Trin.—Upper Karakásh Valley, 16,000 ft.

* 403. **Elymus sibiricus,** Linn.—Ladák and Yārkand, up to 14,000 ft.

404. **Elymus pseudo-agropyrum,** Turcz. — Tanksé Valley, Ladák, 14,000 ft.

* 405. **Hordeum pratense,** Linn.—Ladák and Karakásh Valley, 13,000 ft.

* 406. **Hordeum** (cultivated species and varieties).—Barley is cultivated in Ladák up to 15,000 ft., and in Yārkand to 9000 ft.; the flour made from roasted barley is called sutoo in Ladák, and is used as oatmeal is in Scotland, simply mixed with water; very sour beer, called chang, is also made from it, but in Yārkand no fermented or spirituous liquor of any sort is allowed.

* 407. **Andropogon Ischæmum,** Linn. — Yārkand Plains.

* 408. **Andropogon Sorghum,** Brot.

* 409. **Andropogon saccharatus,** Roxb.—The two last are cultivated near Yārkand City.

FILICES.

410. **Cystopteris fragilis,** Bernh.—This was the only fern met with in Ladák; it was found growing along the Indus. No ferns were seen in Yārkand.

EQUISETACEÆ.

411. **Equisetum arvense,** L.—Drās Valley.

412. **Equisetum ramosum,** Schl. — Indus Valley, Ladák.

ALGÆ.

Tibet.

Schizosiphon —— ? fragments only.

Pleurococcus cinnamomeus, Menegh?

Cosmarium Cucumis, Corda.

A small variety, and very scarce.

Odontidium hiemale, Lyngb.

Navicula cryptocephala, Ktz.

From hot saline springs above Gokra, Tibet.

Phormidium lucidum, Ag.? rather fragmentary, nearest that species if not identical.

Denticula obtusa, Sm.

Œdogonium flavescens, n. sp.—Tibet.

The largest and most abundant, but no fruit. Near *Œdogonium rivulare*, Le Clerc. Fig. 1.

Characters. Articulo terminali obtuso, articulis diametro (·002 inch) 4-plo longioribus, oogoniis ignotis.

Mixed with the above, but in small quantity, is another of the same genus—viz.,

Œdogonium affine, n. sp.

Char.—Articulo terminali truncato, articulis diametro (·001 inch) 2-plo longioribus, oogoniis fuscis, globosis. Fig. 2.

Allied to *Œdogonium fonticola*, A. Braun.

Synedra Ulna, Ehrb.

Gomphonema tenellum, Ktz., a few frustules only.

KARGIL, TIBET.

Eunotia Arcus, Ehrb.

Amphora Hohenackeri, Rabh.

Navicula cryptocephala, Ktz.

Synedra tenuissima, Ktz.

Odontidium hiemale, Ktz.

KARATAG LAKE, YARKAND, 16,000 feet.

Zygnema Karatogana, n. sp.?

Char.—Sordide viridis; articulis sterilibus diametro (·001 inch) 2-plo vel 2½-plo longioribus; *Zygosporis ignotis*. Fig. 3.

Cymbella gastroides, Ktz.

C. cuspidata, Ktz.

Denticula obtusa, Sm.

YĀRKAND.

Spirogyra sordida, n. sp.?

Char.—Sordide viridis; articulis diametro (·0014 inch) 2-plo vel 3-plo longioribus; spira valida; *Zygosporis ignotis*. Fig. 4.

KITCHIK YILAK, YĀRKAND.

Odontidium hiemale, Ktz.

NURLA, TIBET.

Odontidium hiemale, Ktz.

Hot Saline Springs above Gogra, Tibet.

Schizosiphon Hendersoni, n. sp. Fig. 5.

Char.—Strato subcrasso, olivaceo-fusco; trichomatibus simplicibus, plus-minus articulatis, articulis subæqualibus, dilute ærugineis; vagina crassa, cartilaginea, aureo-lutea, sursum attenuata et hyalina.

Diameter at base = ·0008 inch.

DRAS VALLEY, TIBET.

Oscillaria ——?

Very fragmentary, apparently allied to *O. Mougeotii*, Bory.

Cymbella gastroides, Ktz.

C. Pediculus, Ehrb.

Navicula cryptocephala, Ktz.

Odontidium mesodon, Ktz.

TANKSE, TIBET.

Cymbella gastroides, Ktz.

Navicula cryptocephala, Ktz.

Synedra Arcus, Ktz.

Odontidium mesodon, Ktz.

LAMA YURU, TIBET.

Hormiscia —— ?

Fragmentary, allied to *H. æqualis*, Ktz.

Synedra Ulna, Ehrb.

Cymbella cuspidata, Ktz.

TIBET.

Spirogyra Tibetana, n. sp. ?

Char.—Subtilissima, sordide viridis; fascia spirali unica; articulis vegetativis diametro (·0004 inch) 3-plo longioribus; *Zygosporis ignotis*. Fig. 16.

TIBET.

Hormiscia ——— ?

Fragmentary; apparently near *H. Zonata*, Web. et M.
Eunotia Arcus, Ehrb.
Cymbella gastroides, Ktz.
Navicula cryptocephala, Kt.
Pinnularia cocconeoides, Rabh. ? (1 or 2 only seen).
Gomphonema glaciale, Ktz.
Odontidium mesodon, Ktz.

TIBET.

Cymbella gastroides, Ktz.
Navicula cryptocephala, Ktz.
Pinnularia nodosa, Ehrb.
Odontidium mesodon, Ktz.

SUMMARY.

Family ZYGNEMACEÆ.

Zygnema Karatogana, n. sp. Karatág lake, Yārkand, 16,000 feet.
Spirogyra sordida, n. sp. ? Yārkand.
S. Tibetana, n. sp. ? Tibet.

Family CONFERVACEÆ.

Œdogonium rivulare, Le Clerc ? Tibet.
Œ. fonticola, A. Braun ? Tibet.
Hormiscia æqualis, Ktz. ? Lama Yuru, Tibet.

Family Desmidiaceæ.

Cosmarium Cucumis, Corda. Tibet.

Family Oscillariaceæ.

Schizosiphon Hendersoni, n. sp. Nurla, Tibet.
Phormidium lucidum, Ag.? Hot spring, Tibet.
Oscillaria? near *O. Mougeotii*, Borg. Dras valley, Tibet.

Family Palmellaceæ.

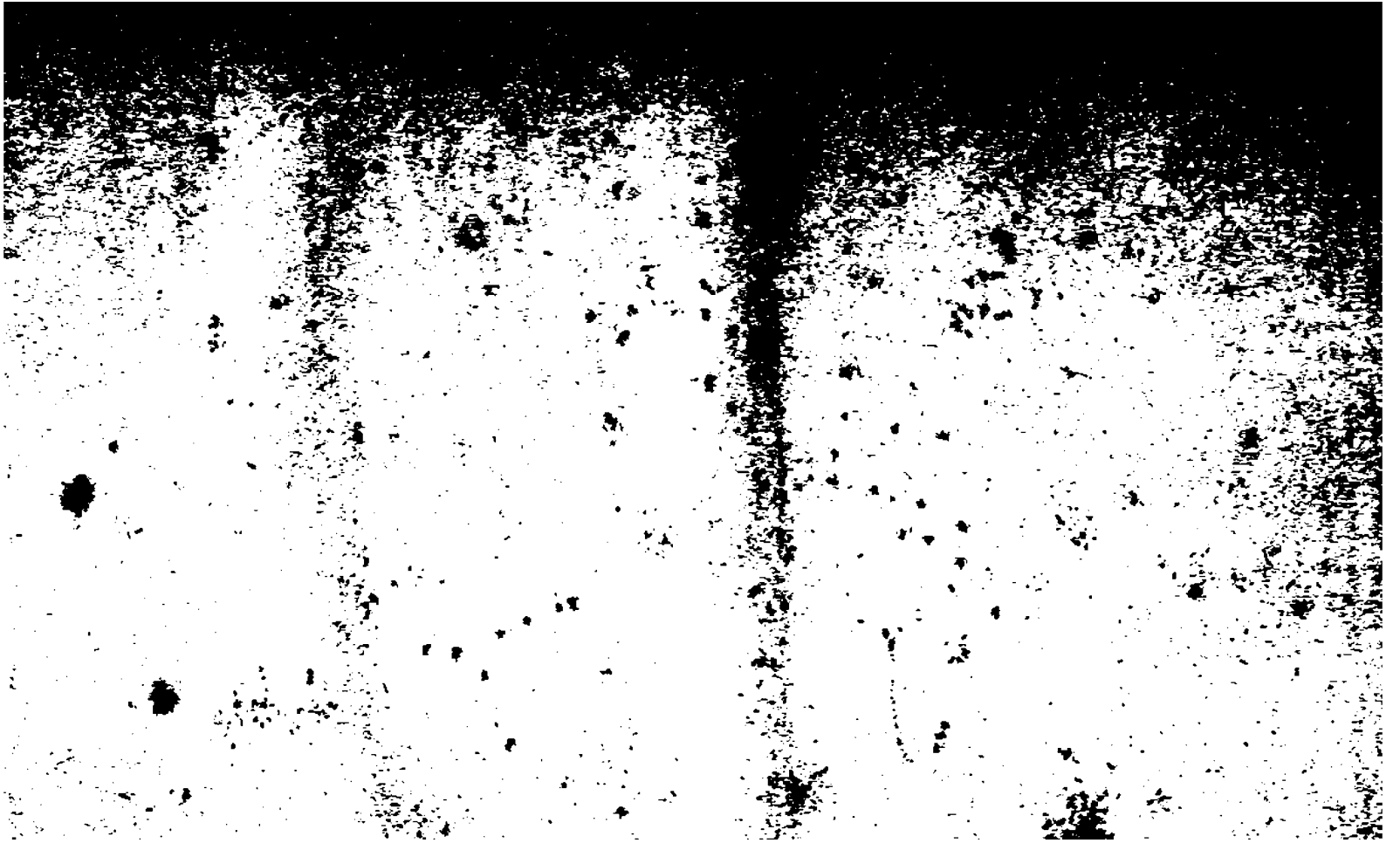
Pleurococcus cinnamomeus, Menegh. Tibet.

Family Diatomaceæ.

Eunotia Arcus, Ehrb. Tibet.
Cymbella gastroides, Ktz. Tibet. Yārkand.
——— *cuspidata*, Ktz. Tibet. Yārkand.
——— *Pediculus*, Ktz. Tibet.
Navicula cryptocephala, Ktz. Tibet.
Pinnularia nodosa, Sm. Tibet.
P. cocconeoides, Rabh. Tibet.
Amphora Hohenackeri, Rabh. Tibet.
Synedra Arcus, Ktz. Tibet.
S. Ulna, Ehrb. Tibet.
S. tenuissima, Ktz. Tibet.
Gomphonema glaciale, Ktz.
G. tenellum, Ktz. Tibet.
Odonitidium hiemale, Ktz. Tibet. Yārkand.
O. Mesodon, Ktz. Tibet.
Denticula obtusa, Linn. Tibet. Yārkand.

PART III.

METEOROLOGY.



Date, 1871.	Barometer.		Aneroids.			Hypsometers.			Thermometers.			Dew-point.	Humidity.	Estimated Height.	Place.	Remarks.
	Reading	a. t.	Large.	a. t.	Small.	No. 1.	No. 2.	No. 3.	Min.	Dry.	Wet.					
m. d. h.	Inches.	°	Inches.	°	Inches.	°	°	°	°	°	°	°		Feet.		
4 27 8 A.M.	27·649	67·4	28·32	73·3	...	..	...	...	...	...	...	...	...	2215	Deyra Observatory	Error of large aneroid ·77.
11½ ,,	27·686	81	28·325	79	...	...	...	...	...	...	...	...	...	...	,, ,,	
5 13 6½ ,,	...	...	29·85	75	...	...	...	...	...	...	...	...	...	2000	Goojranwala, near Wazirabad	
11 ,,	..	...	29·90	...	...	...	...	...	...	93						
14 6 P.M.	28·52	92	29·45	...	...	...	...	...	...	...	...	...	...	1300	Jamu	
15 8 ,,	...	...	...	...	28·40	...	...	...	...	...	...	...	...	...	Bed of stream below Jamu	
16 6 A.M.	...	...	...	...	27·05	...	...	...	...	...	...	...	...	3000	Dansál	
8 ,,	...	...	...	...	27·60	...	...	...	...	...	...	...	...	...	Ugerbai	
?	...	...	...	...	27·30	...	...	...	...	...	...	...	...	...	Krimchi	
?	...	...	25·20	95	...	...	...	...	...	...	...	...	...	...	Top of hill above Mir	
?	25·10	...	25·80	90	...	203·3	...	...	...	...	...	..	...	5122	Mir	
18 9 ,,	...	...	27·20	75	26·50	...	...	...	..	...	...	...	...	...	Jalun	
5 P.M.	...	...	...	...	25·34	...	...	...	...	...	...	...	...	...	Landré	
7 ,,	25·15	79·7	26·05	82	...	203·4	..	...	...	...	...	...	...	4993		
19 9 A.M.	...	...	...	...	22·35	197·1	...	...	...	...	...	...	...	8646	Lura Lári	
4 P.M.	...	...	...	...	24·80	...	...	...	...	...	...	...	...	6000	Balot	
20 2½ ,,	...	...	...	...	27·10	...	...	...	...	...	...	...	...	3000	Chenat Bridge	
4 ,,	...	...	...	...	27·00	...	...	...	...	...	...	...	...	3000	Rám Ban	
21 6 ,,	...	...	...	...	25·90	...	...	...	...	...	...	...	...	5000	Ram Su	
22 noon	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	Sun thermometer 194°.
23 10 A.M.	...	...	...	...	24·70	...	...	...	...	...	...	...	...	9000	Banihál	Rain during night up to 9 A.M.

Date, 1871.			Barometer.		Aneroids.			Hypsometers.			Thermometers.			Dew-point.	Humidity.	Estimated Height.	Place.	Remarks.
			Reading	a. t.	Large.	a. t.	Small.	No. 1.	No. 2.	No. 3.	Min.	Dry.	Wet.					
m.	d.	h.	Inches.	°	Inches.	°	Inches.	°	°	°	°	°	°	°		Feet.		
	24	12½ P.M.	...	...	22·20	75	21·65	...	...	...	...	...	...	...	...	...	Top of Pass	Severe thunderstorm after 4 P.M. lasting all night, with rain in torrents.
	25	?	...	...	...	...	...	...	...	...	..	..	...	...	...	...	Vernay	Another severe thunderstorm after 4 P.M., lasting all night.
	26	5 P.M.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	Atchibril	Thunderstorm.
	27	,,	...	...	...	...	...	...	...	...	...	...	...	...	...	...	By boat from Islámábád	Rain in afternoon on river.
6	3	9 A.M.	24·90	69·5	25·55	65	24·90	203	..	...	...	...	...	...	...	5,061	Srínagar	
	5	10½ ,,	...	...	25·60	65	...	...	...	...	64	68	58	51·5	·557	...	,,	Wind S., rain, thunder.
		3 P.M.	...	...	25·55	65	...	...	...	...	...	67	60	55·8	·675	...	,,	This is the season of thunderstorms and the wind varies constantly.
		9 ,,	...	...	25·60	64	...	...	...	...	...	59	59	59	1·000	...	,,	
	6	6 A.M.	...	..	25·60	60	...	...	...	...	52	57	55	53·7	·886	...	,,	Wind S.E., with thunder and rain in afternoon.
		3 P.M.	...	...	25·505	70	...	...	...	...	...	71·5	65	61·8	·716	...	,,	A maximum thermometer registered 80°·5.
		9½ ,,	...	...	25·60	66	...	...	...	...	..	66	57	51·0	·587	...	,,	
	7	6½ A.M.	...	...	25·50	60	...	...	...	...	52	62	58	55·6	·796	...	,,	Clear.
		9 ,,	..	...	25·55	69	...	...	...	...	...	72·5	64·5	60·4	·659	...	,,	Breeze from N., max. ther. 82°.
		3 P.M.	...	...	25·50	75	...	..	...	...	...	77	62	53·0	·413	...	,,	Sun thermometer 204°.
		10 ,,	...	..	25·50	68	...	...	...	...	...	60	57	55·2	·841	...	,,	Thunder in afternoon.
	8	7½ A.M.	...	...	25·55	60	...	...	...	...	53	64	58	54·3	·709	...	,,	Fine, calm.
	9	6 ,,	..	...	25·50	60	...	...	...	...	58	60	57	55·2	·841	..	,,	Slight rain during night.
	10	3 P.M.	...	...	25·45	82	...	...	...	...	...	82	70	64·7	·660	...	,,	Fine, max. in shade 85°, in sun 188°.
	13		...	...	...	...	...	...	...	...	...	...	...	...	...	...	,,	Severe thunderstorm.
	20	noon	21·252	82	22·00	80	21·50	195·4	195·15	...	...	...	...	...	...	9,812	Báltal	Fine.
	21	5 A.M.	...	...	21·90	...	21·15	...	...	...	...	...	...	...	...	...	,,	Fine.
		?	...	...	20·50	...	19·85	...	...	...	..	...	...	...	...	...	Highest point of Pass	

	8	A.M.	...	...	...	...	...	19 90	...	...	...	...	...	..	...	...	At foot of Glacier on Zoji-lá.	
	2	P.M.	...	...	21·05	...	20·20	...		...	...	...	...	...	...	...	Near Mataion	
22	10	,,	...	...	20·10	70	20·50	...	...	...	...	...	...	...	...	...	Dras	
23	4	A.M.	...	...	...	...	20·60	...	...	...	...	...	...	...	...	...	,,	
	9	P.M.	...	...	22·00	...	21·00	...	...	...	...	...	...	...	...	...	Táshgám	
24	10	,,	...	...	22·35	...	...	...	...	...	...	...	...	...	...	..	Kirkichu	
25	9	,,	...	...	22·00	...	20 80	...	...	...	...	...	...	...	...	...	Paskyum	
26	4	A.M.	20·455	75	21·25	71	20·25	...	...	...	...	...	...	...	...	10,870	,,	
27	4	,,	..	...	21·20	60	20·30	...	...	...	...	...	...	...	...	...	Shergul	7 A.M. very bright solar halo.
	9	,,	...	...	20·40	80	19·40	...	...	...	...	...	...	...	...	...	At spring in Námyíka Pass	
	10	,,	19·03	85	19·70	85	18·85	...	...	...	...	...	...	...	...	12,136	At top of Námyíka Pass	
	8	P.M.	...	...	20·35	75	19·40	...	...	...	...	...	...	...	...	...	Kárbu	
28	7½	A.M.	18·35	69	18·95	65	18·35	...	...	...	...	...	...	...	...	13,944	Top of Fota la Pass	
	9	P M.	...	...	20·35	63	19·50	...	...	...	...	...	...	...	...	...	Lama Yuru	
29	5	A.M.	...	...	...	...	20·35	...	...	...	...	...	...	...	...	...	Stream below, ditto	
	6	,,	...	...	...	...	20·55	...	...	...	...	...	...	...	...	..	Indus Bridge	
	10	P.M.	...	...	21·35	72	20·40	...	...	...	...	...	...	...	...	...	Nurla	
30	9	,,	...	...	21·15	75	20·10	...	...	...	...	...	...	...	...	...	Sospul	
7 1	9	,,	...	...	21·10	70	20·10	...	...	...	...	...	...	...	...	...	Nimu	
2	7	A.M.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	Pituk	Very bright solar halo.
6	1	P.M.	19·65	76	20·20	72	19·25	191·8	191·5	191·2	...	...	...	...	...	11,980	Ló	In Dr. Cayley's garden.
	5⅝	,,	19·62	87	20·15	80	19·20	191·5	191·6	...	...	...	...	...	...	...	At G. T. S. Station	
8	5	A.M.	...	...	20·70	65	19·75	...	...	...	...	...	..	...	..	..	Tikshé	
	2	P.M.	...	...	...	...	...	...	...	...	...	85	62	47·3	271	...	Chimré	Under awning.
	10½	,,	...	...	20·00	72	19·00	...	...	...	...	...	...	...	...	...	,,	
9	5	A.M.	...	...	...	...	...	...	...	...	56	...	...	...	...	...	,,	Min. ther. placed on a box, 18 inches above ground, and exposed all night.
	noon		...	...	19·455	76	...	...	...	...	...	70	60	54·3	577	...	Sakté	
	2	P.M.	18·91	74	19·455	74	...	189·25	...	...	...	67	56	48·7	520	12,964	,,	There were some clouds in the forenoon, and towards night slight rain.
	3	,,	18·90	72	19·45	72	...	...	...	...	...	..	...	...	...	...	,,	
	4	,,	18·90	72	19·45	72	...	...	...	...	...	65	56	50·2	588	...	,,	
	5	,,	...	...	19·45	68	...	...	...	...	...	63	56	50·9	647	...	,,	
	10½	,,	...	...	19·50	60	...	...	...	...	...	...	...	...	..	...	,,	
10		,,	...	...	...	...	...	...	...	...	45	...	...	...	...	...	,,	Min. ther. exposed all night. Cloudy.

Date, 1871.			Barometer.		Aneroids.			Hypsometers.			Thermometers.			Dew-point.	Humidity.	Estimated Height.	Place.	Remarks.
			Reading	a. t.	Large.	a. t.	Small.	No. 1.	No. 2.	No. 3.	Min.	Dry.	Wet.					
m.	d.	h.	Inches.	°	Inches.	°	Inches.	°	°	°	°	°	°	°		Feet.		
		5 A.M.	...	...	19·40	55	18·60	...	...	...	...	...	...	...	...	...	At small lake, half-way up	
		8 ,,	...	...	17·355	58	...	...	...	...	...	...	...	...	...	...	Chang la Pass	
		noon	15·73	61	16·05	61	15·60	...	..	181	...	..	...	...	...	18,123	Top of Pass	
	11	6 A.M.	...	...	17·10	42	...	...	...	...	33	...	...	...	...	...	Chortak Lake	
		10½ P.M.	...	...	19·20	62	18·30	...	...	...	...	...	...	...	...	...	Durgu	
	12	6 A.M.	...	...	...	...	...	...	...	...	42	...	...	...	...	...	,,	
		6½ P.M.	...	..	18·55	72	17·70	...	...	...	...	69	53	43·7	401	...	Muglib	
		10½ ,,	...	...	18·605	59	...	...	...	...	...	56	43·5	33·4	427	...	,,	*Note.*—Owing to the number of loose horses running about the camp at night, I was sometimes obliged to put the minimum thermometer under the awning in front of my tent, but this is always noted.
	13	5 A.M.	...	...	...	...	...	...	...	...	41	...	...	...	..	...	,,	
		10 P.M.	...	...	18·20	57	17·45	...	...	...	...	50	...	...	...	...	Lukung, at head of Pangong Lake	
	14	5 A.M.	...	...	...	...	...	...	...	...	41	...	...	...	...	...		
		10 P.M.	...	...	17·60	51	16·90	...	...	...	...	44	...	...	...	...	Chagra	
	15	5 A.M.	...	...	...	...	...	...	...	...	37 in tent	...	...	...	...	...	,,	
		9 ,,	...	..	...	...	15·10	...	...	...	...	...	...	...	...	...	Top of Másimik Pass	
		5 P.M.	16·26	56	16·60	63	15·85	...	...	182·4	...	...	...	...	...	17,080	Panlung	
	16	5 A.M.	...	..	...	...	...	...	...	...	23	...	...	...	...	...	,, ,,	
	17	2 P.M.	17·42	85	...	...	16·75	...	185·8	185·4	33	...	...	...	...	15,618	Pamtzil	Sky overcast.
		6 ,,	...	...	...	...	...	...	...	...	...	63	...	...	...	...	,,	Under an awning.
	18	6 A.M.	...	...	...	...	...	...	...	...	43	...	...	...	...	...	,,	ditto.
		11⅔ ,,	17·10	98	17·40	95	16·40	...	...	...	...	...	...	...	...	16,008	Gokra	
		1½ P.M.	16·95	75	17·35	77	16·40	...	...	...	...	...	...	...	...	...	,,	
		4½ ,,	16·98	72	17·40	75	16·40	...	...	...	...	64	45	30·6	286	...	,,	
		5 ,,	...	...	...	...	...	184·9	184·6	...	...	62·5	43	26·7	257	...	,,	
		6 ,,	...	...	...	...	...	...	...	...	...	60	43	293	313	...	,,	
		10⅔ ,,	...	...	17·405	59	16·50	...	...	...	...	40	...	...	...	...	,,	
	19	8½ A.M.	...	...	..	...	...	...	...	...	28	...	...	...	...	...	,,	

	6	P.M.	16·27	63	16·70	65	15·80	...	...	...	...	...	...	...	...	16,999	Camp above		
	7½	,,	...	...	...	...	...	...	...	183	...	51	35	17·6	254	...	Hot spring		
	9½	,,	...	...	...	...	...	...	...	...	...	28	...	...	...	...	,, ,,		
20	5½	A.M.	...	...	...	...	...	...	...	...	11	13	...	...	...	...	,, ,,		
	10	,,	14·89	62	15 35	65	...	179·2 in steam	...	178·4 in water	...	...	...	...	...	19,695	Top of Pass, "Cayley's"		
	10½	,,	14·91	...	15·30	...	..	...	...	...	...	...	...	...	...	...	,, ,,		
	11	,,	14·90	62	15·55	60	...	...	...	...	...	...	...	...	...	...	,, ,,		
	5	P.M.	15·23	73	15·70	71	14·80	180·1 in steam	179·8	180 in water	...	48	...	...	...	18,847	Gnischu		*Gni*, two, *chu*, waters; meeting of two waters.
	7½	,,	...	...	...	...	...	...	...	..	...	43	29	13·9	283	...	,,		
	9	,,	...	...	...	...	...	...	...	..	...	38	28	17·5	415	...	,,		Here there was old snow within fifty yards of our tents.
21			...	...	...	...	...	...	...	..	10 out in open	...	...	...	...	...	,,		
21			...	...	...	...	...	...	...	...	32 in tent	...	...	...	...	...	,,		Several horses died from the intense cold.
	9	P.M.	...	..	...	...	...	...	...	181·7	...	30	...	...	...	...	Lingzi Thang		
22	6	A.M.	15·88	37	16·70	32	15·40	...	...	...	20	...	...	...	...	17,341	,, ,,		
23	1½	P.M.	15·98	70	16·40	65	15·40	...	...	...	...	...	...	...	...	17,537	Camp Lak Zung		
	3	,,	...	...	16·40	67	...	...	...	...	...	...	...	...	...	...	,, ,,		
	5½	,,	...	...	...	...	...	...	...	...	...	...	...	...	...	...	,, ,,		
24	8	A.M.	16·00	65	16·50	53	15·45	182·3	182	...	...	57	41	28·2	332	...	,, ,,		
	6	P.M.	15·94	53	16·40	60	15·35	...	...	...	15	54	41	31·0	416	...	,, ,,		
25			...	...	...	...	...	...	...	...	...	50	35·5	21·9	323	...	,, ,,		
	6½	,,	16·44	63	17 00	62	15·80	...	...	...	7	...	...	...	...	...	,, ,,		
26	5½	A.M.	16·54	36	17·10	31	15·95	183·9	183·6	183·6	...	54	...	...	...	16,763	Tarldat		25° min. in tent.
	4	P.M.	16·84	73	16·80	74	15·70	183·2	182·9	...	10	...	...	...	...	16,199	,, ,,		30° min. in tent.
	8	,,	...	...	...	...	...	...	...	...	...	...	...	...	...	17,270	Patsalung		Bar. supposed read ·5
27	8	A.M.	...	...	...	...	...	...	...	...	...	49·5	35·5	21·3	323	...	,,		
	10	,,	...	...	...	...	...	...	...	...	...	52	44	38·7	600	...	,,		Min. in tent 32°.
	11	,,	...	...	16·95	55	...	...	...	...	...	65	46	32·4	299	...	,,		
	noon		...	...	16·95	57	...	...	...	...	...	63·5	44	28·7	270	...	,,		
	1	P.M.	...	...	16·95	60	...	...	...	...	...	63·5	44	28·7	270	...	,,		
			...	...	16·90	63	...	...	...	...	...	70·5	47	29·7	222	...	,,		

Date, 1871.			Barometer.		Aneroids.			Hypsometers.			Thermometers.			Dew-point.	Humidity.	Estimated Height.	Place.	Remarks.
			Reading	a. t.	Large.	a. t.	Small.	No. 1.	No. 2.	No. 3.	Min.	Dry.	Wet.					
m. d.	h.		Inches.	°	Inches.	°	Inches.	°	°	°	°	°	°	°		Feet.		
	2	P.M.	...	...	16·90	65	...	183·2	182·9	...	...	69·5	47·5	32·1	252	...	Patsalung	
28	sunrise		...	...	...	...	...	...	...	...	18	...	...	...	...	...	,,	Min. in tent 32°.
	6½	P.M.	16·74	65	17·10	65	16·05	184·2	183·9	...	...	...	...	...	...	16,364	Lung Dung	
29	10½	A.M.	17·22	77·5	17·60	61	16·50	...	...	...	20	...	...	...	...	15,620	Entering Karakásh Valley	Min. in tent 39°.
30	7	,,	18·12	67	18·50	53	17·35	187·9	187·7	...	25	...	...	..	...	13,976	1st Camp in Karakásh	
	11	,,	...	...	...	...	...	187·8	187·6	...	...	...	...	...	...	...	3 miles down	
	3	P.M.	18·54	70	18·35	...	17·30	...	...	...	...	66	51	41·9	420	14,152	,, ,,	
	10	,,	...	...	...	74	...	...	...	...	...	47	41	36·2	660	...	,, ,,	Bar. supposed read ·5 too high.
31			...	...	...	...	...	...	...	...	25	...	...	...	...	...	,, ,,	
	6	,,	18·31	67	18·65	...	...	188·4	188·1	...	...	...	...	...	...	13,872	17 miles down	
8 1	?	A.M.	...	...	...	67	...	...	..	...	30	...	...	...	...	...	,, ,,	
	6	P.M.	18·67	66	19·10	...	17·85	189·3	189·1	...	...	...	...	...	...	13,312	12 miles down	
2	noon		18·84	86	19·15	66	17·90	189·6	189·4	...	28	...	...	...	...	...	,, ,,	At 2 P.M. 85° in tent.
	6	P.M.	18·85	70	19·70	77	18·00	...	...	...	...	...	...	...	...	...	,, ,,	
3	?	A.M.	...	...	...	70	...	...	...	...	31	...	...	...	...	...	,, ,,	At 10 P.M. 55° in tent.
	6	P.M.	19·08	67	19·50	...	18·15	...	...	...	...	...	...	...	...	...	,, ,,	Min. in tent 47°.
4	6	A.M.	...	...	...	67	...	...	...	...	44	51 in tent	...	..	...	...	,,	
	4	P.M.	19·19	73	19·55	75	18·25	190·5	190·4	...	...	...	...	...	...	12,672	Bálakchi	
5	9	A.M.	..	...	19·65	68	...	...	...	...	44	65·5	53	45·7	490	...	,,	
	10	,,	...	...	19·65	68	...	...	...	...	...	70	55·5	47·5	450	...	,,	
	11	,,	...	...	19·65	69	...	...	...	...	...	71	55	45·9	401	...	,,	
	noon		...	...	19·65	70	...	...	...	...	...	72	55	45·2	385	...	,,	Observations made under an awning at this halt.
	1	P.M.	...	...	19·60	70	...	...	...	...	...	73·5	55·5	45·2	367	...	,,	
	3	,,	...	...	19·60	71	...	...	...	...	...	71	54	43·9	378	...	,,	
	6	,,	...	...	19·65	70	...	...	...	...	...	65	50	39·8	398	...	,,	
	8	,,	...	...	19·70	63	...	...	...	...	...	58	48	41·2	536	...	,,	

	10	„	...	...	19·70	58	...	...	...	...	...	50	46	43·3	778	...	„	
6	—	A.M.	...	...	...	...	...	...	...	...	41·5	...	...	...	...	...	„	
7	7	„	19·81	56	20·25	50	18·95	192·1	191·95	...	35·5	...	...	..	...	11,453	Tograsu river below Shâhidulla	
	1	P.M.	...	...	...	...	...	192·8	192·6	...	...	...	...	...	...	11,061	Pila-ta-Gâsh, 9 miles down	
8	6½	A.M.	20·20	60	20·60	55	19·30	...	...	...	48·5	...	...	...	...	10,958		
	4	P.M.	19·24	65	19·60	63	18·60	...	190·5	...	...	...	...	...	...	12,457	Ravine below Sân-ju Pass, north side	
9	6	A.M.	...	...	...	...	...	...	...	...	43·5	...	...	...	...	...	„ „	
	8	„	17·95	57	18·35	52	17·45	...	...	...	...	...	...	...	...	14,277	Foot of Pass, after 2 hours' walk	
		noon	16·41	53	16·80	53	16·00	182·35	182·0	...	..	43	..	...	...	16,682	Top of Pass, 1½ hours' ride	Hypsometers appear to have been read incorrectly.
	5	P.M.	19·43	62	...	...	...	...	...	...	...	...	...	...	...	12,066	Kitchik Yîlâk	
	7	„	...	..	19·75	54	18·55	191·0	190·9	...	...	...	...	...	...	...	„ „	
10			...	...	...	...	...	...	...	...	32·5	...	...	...	...	...	„ „	
11	6	A.M.	21·77	59	22·15	55	20·19	196·5	196·3	...	45	45	...	...	...	8,747	Tâm, 15 miles down ravine	
	6	P.M.	20·43	65	20·85	64	19·65	193·4	193·2	...	...	...	...	...	...	10,631	Half-way up Chu Chu Pass	
12			...	...	...	...	19·05	...	...	...	45	...	...	...	...	...	Top of Pass	
13	9	A.M.	...	...	22·75	67	...	...	...	...	49	71	61	55·9	590	8,359	Bank of Arpalak River	
	10	„	22·25	69	22·70	71	...	...	...	...	...	70	59·5	53·2	553	...	„ „	
		noon	...	...	22·66	72	...	...	...	...	...	73	61	54·8	530	...	„ „	
	1	P.M.	...	...	22·65	73	...	...	...	...	...	71	59	52·3	518	...	„ „	
	2	„	...	...	22·65	72	...	...	...	...	...	72·5	59·5	52·2	490	...	„ „	
	4½	„	...	...	22·65	71	...	...	...	...	...	72·5	59·5	52·2	490	...	„ „	
	6	„	...	...	22·65	69	...	...	...	...	...	63·5	53	45·9	530	...	„ „	
	7	„	...	...	22·66	66	...	197·5	197·5	...	...	65	51	40·4	407	...	„ „	
14	9	A.M.	...	...	22·70	62	...	...	...	..	...	65	53	44·8	480	...	„ „	Observations made under an awning.
		noon	...	...	22·65	66	...	...	...	...	...	72·5	60	53·3	510	...	„ „	
	2	P.M.	...	...	22·65	68	...	...	...	...	...	70	60	54·7	585	...	„ „	
	5	„	...	...	22·65	65	...	...	...	...	...	65	56·5	51·5	617	...	„ „	
	9½	„	...	...	22·65	63	...	197·4	...	...	...	62	55	50·7	665	...	„ „	
15	9	A.M.	...	...	22·70	61	...	...	...	...	...	66	58·5	74·4	664	...	„ „	

Date, 1871.	Barometer.		Aneroids.			Hypsometers.			Thermometers.			Dew-point.	Humidity.	Estimated Height.	Place.	Remarks.
	Reading	a. t.	Large.	a. t.	Small.	No. 1.	No. 2.	No. 3.	Min.	Dry.	Wet.					
m. d. h.	Inches.	°	Inches.	°	Inches.	°	°	°	°	°	°	°		Feet.		
11 A.M.	...	...	22·70	67	...	...	...	...	...	71	60	54·1	553	...	Bank of Arpalak River	
noon	...	...	22·70	67	...	...	...	...	...	65	57	52·4	640	...	,, ,,	Slight rain in afternoon.
1 P.M.	...	...	22·70	64	...	...	...	...	...	65	57	52·4	640	...	,, ,,	
4 ,,	...	...	22·70	61	...	...	...	...	...	60	55	52·0	750	...	,, ,,	
7 ,,	...	...	...	...	...	197·4	197·4	...	...	...	...	...	...	...	,, ,,	
16 10½ P.M.	23·86	75	24·25	70	22·80	...	...	200·75	...	..	...	...	...	6378	Sánju	
17 ...	...	...	...	...	...	...	...	...	51	...	...	...	...	...	,,	
18 6 A.M.	24·24	66	24·65	65	...	...	...	...	60	...	...	...	...	5833	Koshtak	
19 6 ,,	24·27	66	24·65	...	...	...	...	...	55	...	...	...	...	5800	Oi-Tográk	
1½ P.M.	24·62	91	25·00	95	...	...	...	...	...	...	...	...	...	5577	Bora	
20 10 ,,	...	...	...	...	...	203·5	203·6	...	...	...	...	...	...	4695	Kargallik	
6 ,,	25·33	85	25·85	91	...	...	...	...	...	...	...	...	...	...	,,	
21 7 ,,	25·65	67	26·10	78	...	...	...	...	67	...	...	...	...	4221	Posgam	
22 2½ ,,	25·80	79	26·30	78	...	204·6	204·4	...	...	...	...	...	...	4089	Yangi Bázár	A slight shower on the march.
23 9 ,,	...	...	...	...	...	...	...	...	...	70	...	...	...	...	Yárkand Fort	Observations all made in an open lofty verandah with a north exposure, except minimum thermometer, which was always placed out all night on a wooden box a few inches off the ground.
24 8½ A.M.	26·00	70	26·45	69	...	...	...	...	60·5	...	...	...	...	3868	,, ,,	
9½ ,,	...	...	26·41	70	...	...	...	...	...	69	62	58·0	681	...	,, ,,	
1½ P.M.	..	...	26·40	72	...	...	..	...	...	79	64	55·4	443	...	,, ,,	
25 4 ,,	...	...	...	...	...	...	...	...	..	79	69	64·3	610	...	,, ,,	
26 9 A.M.	...	...	26·55	70	...	...	...	...	...	74	64	58·5	587	...	,, ,,	
10 ,,	26·07	73	26·55	72	...	...	...	...	...	79	68	62·7	575	3798	,, ,,	
2 P.M.	...	...	26·50	...	...	...	...	...	...	83	67	58·6	438	...	,, ,,	
4 ,,	...	...	26·45	...	...	...	...	...	...	84	68	60·0	444	...	,, ,,	
27 1 ,,	...	...	26·40	77	...	...	...	...	...	84·5	68	59·6	432	...	,, ,,	
28 9 A.M.	...	...	26·36	74	...	...	...	...	...	78	64	56·0	480	...	,, ,,	
29 7 ,,	...	...	26·30	73	...	...	...	...	...	75	62	54·2	484	...	,, ,,	
8 ,,	...	...	26·30	75	...	...	...	...	...	80	65·5	57·6	465	...	,, ,,	
10 ,,	...	...	26·30	77	...	...	...	...	...	86	65	52·7	321	...	,, ,,	
12½ P.M.	...	...	26·30	80	...	...	...	...	...	89	67	54·9	316	...	,, ,,	
2 ,,	...	...	26·25	83	...	...	...	...	...	90	66	51·1	266	..	,, ,,	

		3	,,	...	...	26·25	84	...	...	...	...	...	92	67	52·6	265	...	,,	,,	
		6½	,,	...	...	26·25	84	...	...	...	...	...	81·5	67	59·6	474	...	,,	,,	
		11	,,	...	...	26·25	79	...	...	...	...	...	71·5	61·5	55·5	572	...	,,	,,	
	30	10	A.M.	...	...	26·25	79	...	...	...	...	67·5	83	65	55·3	389	...	,,	,,	
		noon		...	...	26·20	80	...	...	...	...	...	89	62	42·3	190	...	,,	,,	
		1	P.M.	...	...	26·15	82	...	...	...	...	...	88·5	62	42·8	205	...	,,	,,	
		3	,,	25·64	84	26·10	82	...	...	...	...	...	85	61	43·9	239	4328	,,	,,	
	31	8	A.M.	...	...	26·20	72	...	...	...	...	54	...	..	...	...	...	,,	,,	Simultaneously with fall in the mercurial barometer a fall of snow took place on all the range to the South of Yūrkand.
		noon		...	...	26·15	75	...	...	...	...	...	81·5	56·5	34·3	184	...	,,	,,	
9	1	7	A.M.	...	...	26·30	65	....	...	...	...	53·5	57	...	...	...	...	,,	,,	
		8	,,	...	...	26·30	65	...	...	...	...	...	58	...	...	...	...	,,	,,	
		9½	,,	...	...	26·31	65	...	...	...	...	...	54	...	...	...	...	,,	,,	
		noon		...	...	26·30	68	...	..	...	...	...	73	...	...	...	...	,,	,,	
		1½	P.M.	...	...	26·30	70	..	...	...	...	...	75	...	...	...	...	,,	,,	
	2	7	A.M.	...	...	26·70	62	...	...	...	...	48	54	...	...	...	...	,,	,,	
		9½	,,	...	...	26·70	63	...	...	...	...	...	62	...	...	...	...	,,	,,	
		11	,,	...	...	26·70	65	...	...	...	...	...	65	...	...	...	...	,,	,,	
		noon		...	...	26·70	65	...	...	...	...	...	67	...	...	...	...	,,	,,	
		9	P.M.	...	...	26·70	67	...	...	...	...	...	...	...	...	...	...	,,	,,	
	3	10	A.M.	...	...	26·80	65	...	...	...	...	47	...	...	...	...	...	,,	,,	
		1	P.M.	...	...	26·75	...	...	...	...	...	...	...	...	...	...	...	,,	,,	
		3	,,	...	...	26·70	70	...	...	...	...	...	...	...	...	...	...	,,	,,	
		6	,,	...	...	26·70	70	...	...	...	...	...	...	...	...	...	...	,,	,,	
		7	,,	...	...	26·70	70	...	...	...	...	...	...	...	...	..	...	,,	,,	
	4	3	,,	...	...	26·60	72	...	...	...	...	50	73·5	59	...	...	3958	,,	,,	Height deduced from corrected mean of aneroid readings.
	5			...	...	...	...	...	...	...	...	45	...	...	...	...	...	,,	,,	
		10	,,	...	...	26·60	70	...	...	...	...	...	...	...	...	...	...	Yangi Bázár		
	6	5½	A.M.	26·06	65	26·60	58	...	..	...	...	45	...	...	...	...	4008	,,	,,	The winds in Thibet and Yūrkand always blow up the valleys during the day, and down the valleys during the night. When clouds were seen they were always moving in a direction from S.W. to N.E. nearly.
		6	P.M.	25·85	78	26·30	80	...	...	...	...	...	...	...	...	...	4135	Posgam		
	7			...	...	...	...	...	...	...	...	36·5	...	...	...	...	...	,,		
		6	,,	25·58	76	26·10	83	...	...	...	...	...	...	...	...	...	4427	Kargallik		
	8	6	A.M.	25·60	60	26·20	58	...	...	...	...	33	...	...	...	...	...	,,		
	9	6	,,	24·83	57	25·35	55	...	...	...	...	47	...	..	...	...	5154	Bora		
		4	P.M.	24·37	74	24·85	75	...	...	...	...	...	...	...	...	...	5812	Oi-Tograk		
	10			...	...	24·75	50	...	..	...	...	42	...	...	...	...	...	,,	,,	
		5	,,	24·15	75	24·16	77	...	...	...	...	...	...	...	...	...	6086	Koshtak		Aneroid supposed read ·5 in. too low.
	11	5	,,	23·70	68	24·20	71	...	..	...	...	...	...	..	...	...	6571	Sánju		
		9	,,	...	...	24·25	63	...	...	...	...	...	...	...	...	...	...	,,		

Date, 1871.			Barometer.		Aneroids.			Hypsometers.			Thermometers.			Dew-point.	Humidity.	Estimated Height.	Place.	Remarks.
			Reading	a. t.	Large.	a. t.	Small.	No. 1.	No. 2.	No. 3.	Min.	Dry.	Wet.					
m.	d.	h.	Inches.	°	Inches.	°	Inches.	°	°	°	°	°	°	°		Feet.		
	12		...	...	...	...	...	..	...	...	47	...	...	...	...	...	Sánju	
	13	5 P.M.	21·15	56	21·70	55	...	...	...	...	...	...	...	...	...	9712	Todlak	
	14		...	...	...	...	...	...	...	...	31·5							
	15	6 A.M.	19·51	41	20·30	40	...	...	...	...								
	16	6 ,,	...	...	20·15	33	...	...	...	...	...	...	...	...	...	11,792	Kitchik Yilák	
	17	S ,,	19·32	38	20·00	35	...	...	...	...	24	...	...	...	...	...	,, ,,	
											...	...	...	...	...	12·018	Ravine north of Sánju Pass	
	20	10 ,,	19·78	56	20·25	55	...	...	...	...	19	51	43	36·5	572	11,512	Four miles below Shâhidulla	
		2 P.M.	...	...	20·15	63	...	...	...	...	...	55	41	27·1	341	...	,, ,,	
		7 ,,	...	...	20·20	50	...	...	...	...	...	47	40	33·6	600	...	,, ,,	
	21	6 A.M.	...	...	20·30	40	...	...	...	...	32	...	...	...	...	...	,, ,,	
		3 P.M.	18·70	65	19·10	65	18·20	189·5	189·3	...	...	...	...	...	...	12,965	Camp in Ravine leading to Suket Pass	
	22	7 A.M.	18·81	40	19·30	35	...	...	...	...	23	...	...	...	...	...	...	Min. in tent 36°.
		4 P.M.	16·93	45	17·35	47	...	184·8	184·7	...	...	38	...	...	...	15,774	Foot of Suket Pass	
	23	9½ A.M.	15·74	44	16·20	35	...	...	...	...	4	..	...	...	...	17,745	Top of Pass	Min. in tent 18°, during night.
	24	8 ,,	17·13	30	17·60	21	...	...	...	...	1	...	...	...	...	15,146	Mallik Shah	Min. in tent 23°, during night.
		8½ ,,	...	...	16·65	30	...	...	...	...	..	20	...	..	...	16,904	Karatág Lake	
	25	7 ,,	16·20	35	16·60	40	...	...	...	...	5	34 in tent	...	...	...	...	,, ,,	
		10½ ,,	15·68	52	16·20	54	...	...	...	...	...	...	...	...	...	18,164	Karatág Pass	Snow on march.
	26	7 ,,	16·35	33	16·90	23	...	...	...	...	10	30 in tent	...	...	...	16,472	Shor Jilga	Snow at 10 A.M.
	27	7 ,,	16·78	36	17·40	31	...	...	...	...	7	...	...	...	...	15,886	Khush Maidán	
	28	8 ,,	16·41	35	16·90	31	...	...	...	...	15	33 in tent	...	...	...	16,525	Kizil Jilga	Six inches snow on ground.

		5½	P.M.	16·06	34	16·60	32	...	...	...	...	...	...	...	...	17,120	Shing Lung
	29			...	...	...	...	...	...	...	...	1	...	...	...	...	Halt
	30	7	A.M.	...	...	16·85	15	...	...	...	...	1	...	...	...	...	...
		4½	P.M.	16·02	47	16·50	46	...	...	...	...	...	...	...	...	...	,,
10	1	7	A.M.	...	...	16·50	15	...	...	...	...	...	...	...	...	17,443	Sumdu
		11	,,	15·59	61	16·10	45	...	...	...	...	12	...	...	...	...	,,
		5	P.M.	15·62	43	16·05	46	...	...	...	...	...	...	...	...	18,226	Top of Pass
	2	sunrise		...	...	...	...	...	...	...	...	...	32	...	...	17,908	Linzi Thang
	3	7	A.M.	16·05	28	16·50	20	...	...	...	...	8	...	...	...	...	,, ,,
												0	...	...	...	16,916	West of Gnischu in ravine at foot of Pass
		2	P.M.	15·18	46	15·60	45	...	...	...	...	...	...	...	...	18,844	Top of Pass
		5	,,	...	...	...	...	...	...	...	...	...	24	...	...	...	Ravine S. of Pass
	4	7	A.M.	16·05	25	16·50	22	...	...	...	...	2	...	...	...	16,938	,, ,,
	5	7	,,	17·00	33	17·45	28	...	...	...	...	15	28 in tent	...	...	15,788	Gokra
	6	7	,,	17·50	36	18·05	30	...	...	...	...	9	33 in tent	...	...	14,714	Pamtzil
		4	P.M.	15·92	46	16·65	47	...	...	...	...	...	...	...	...	17,350	Rimdi
		5½	,,	...	...	...	...	...	...	...	...	...	22	...	...	...	,,
		7	,,	...	...	...	...	...	...	...	...	...	16	...	...	...	,,
		7	A.M.	...	...	16·65	...	...	...	...	...	5					
		10	,,	15·34	56	16·05	43	...	180·4	180·1	...	...	32	...	...	18,845	Top of Másimik Pass
		4	P.M.	17·37	68	...	...	...	186·0	185·8	...	...	...	...	...	15,564	Chágra
	8			...	...	17·90	30	...	...	...	...	15	...	...	...	15,253	,,
		2¾	,,	...	...	...	...	...	187·9	187·7	...	...	...	...	...	13,711	Camp at second lake above Tanksé
	9	7	A.M.	...	...	18·60	30	...	...	...	...	13	...	...	...	...	,, ,,
		1	P.M.	18·67	75	19·00	62	...	...	...	...	...	...	...	...	13,040	Tanksé
	10	7	A.M.	18·80	43	19·20	38	...	189·6	189·5	...	23	...	...	...	...	,,
		4	P.M.	...	...	...	...	...	184·45	184·3	...	...	...	...	...	14,885	Chortak Lake
		5	,,	16·82	40	17·20	40	...	...	...	...	...	...	...	...	...	,, ,,
		8	,,	...	...	...	...	...	...	...	...	...	16	...	...	...	,, ,,

Date, 1871.			Barometer.		Aneroids.			Hypsometers.			Thermometers.			Dew-point.	Humidity.	Estimated Height.	Place.	Remarks.
			Reading	a. t.	Large.	a. t.	Small.	No. 1.	No. 2.	No. 3.	Min.	Dry.	Wet.					
m. d.	h.		Inches.	°	Inches.	°	Inches.	°	°	°	°	°	°	°		Feet.		
11	7	A.M.	...	...	17·30	22	...	184·6	181·4	...	4	...	...	...	...	...	Chortak Lake	
	10	,,	15·79	50	16·25	40	...	181·7	181·4	...	...	26	...	...	...	17,516	Top of Chang-la Pass	
	6	P.M.	...	...	19·90	55	...	...	...	...	...	...	...	...	...	...	Chimré	Mercurial barometer was broken near Lé.
12	5	A.M.	...	...	19·90	40	...	...	...	...	27	...	...	...	...	11,690	,,	
	5	P.M.	...	...	20·10	60	...	191·7	191·6	...	...	...	...	...	...	...	Lé	In Dr. Cayley's garden.
13	7	A.M.	...	...	20·15	...	...	192·0	191·85	...	25	...	...	...	...	...	,,	
	1	P.M.	...	...	...	...	...	191·9	191·9	...	...	...	...	...	...	11,525	,,	
14			...	...	...	...	...	...	...	...	25	...	...	...	...	...	,,	
15			...	...	...	...	...	...	...	...	25	...	...	...	...	...	,,	
16			...	...	...	...	...	...	...	...	22	...	...	...	...	...	,,	
17	7	A.M.	...	...	...	...	...	...	...	...	...	32	...	...	...	10,150	Nimu	
18			...	...	...	...	...	194·0	193·9	...	16	...	...	...	...	...	Hemis Shukpa	
20	7	,,	...	...	20·30	30	...	192·4	192·2	...	19	...	...	...	...	11,072	Lama Yuru	
	11	,,	18·80	53	...	...	...	...	...	...	...	...	...	...	...	13,584	Top of Fota-la Pass	
	7½	P.M.	...	...	20 20	48	...	...	...	...	...	36	...	...	...	11,468	Karbu	
21	7	A.M.	...	...	20·30	32	...	192·3	192·1	...	20	...	...	...	...	11,140	,,	
22	7	,,	...	...	20·90	33	...	...	...	...	17	...	...	...	...	10,314	Shérgul	No ice on water of stream.
23			...	...	...	...	...	...	...	...	26	...	...	...	...	...	Kargil	
24	7	,,	...	...	22·20	42	...	...	...	...	...	...	...	...	...	8,630	,,	Very cloudy and a slight fall of snow.
25	7	,,	...	...	21·60	32	...	...	...	...	20	...	...	...	...	9,299	Túshgám	Snow on ground.
26	7	,,	...	...	21·10	22	...	...	...	...	0	...	...	...	...	9,909	Drās	
27			...	...	20·75	...	...	...	...	...	0	...	...	...	...	10,211	Mataion	
28	7	,,	...	...	21·70	30	...	...	...	...	13	...	...	...	...	9,225	Báltal	
29	7	,,	...	...	22·55	30	...	...	...	...	18	...	...	...	...	9,417	Sonamarg	
30			...	...	...	...	...	...	...	...	25	...	...	...	...	..	Gond	
31			...	...	...	...	...	...	...	...	30	...	...	...	...	...	Kangan	
11 1			...	...	...	...	...	...	...	...	28	...	...	...	...	...	Gánderbal	
8	9	P.M.	...	...	25·55	45	...	...	...	...	...	...	...	...	..	4,774	Boniar ruins	

9	7	A.M.	...	...	25·65	35	...	...	...	...	23·5	...	...	...	...	...	" "
10	7	"	...	...	25·60	37	...	...	...	...	25	...	...	...	...	...	" "
		noon	...	...	26·20	75	...	...	...	...	...	...	...	...	...	4,200	Urie
11	7	A.M.	...	...	24·60	44	...	...	...	...	...	...	...	...	...	5,922	Hydrabad
	10	"	...	...	22·60	56	...	...	...	...	...	...	...	...	...	8,383	Top of Haji-Pir Pass
12	7	"	...	...	26·90	55	...	...	...	...	40	...	...	...	...	...	Kahuta
13	8	"	...	...	27·60	58	...	...	...	...	...	...	...	...	...	...	"
14	7	"	...	...	27·90	53	...	...	...	...	...	...	...	...	...	...	Saira
16			...	...	28·10	40	...	...	...	...	...	...	..	...	...	...	Koirelta
17	7	"	...	...	27·90	41	...	...	...	...	26	...	...	...	...	...	Dharmsál
18	7	"	...	...	28·55	48	...	...	...	...	...	...	...	...	...	...	Saidabad
	9½	"	...	...	27·65	55	...	...	...	...	...	...	...	...	...	..	Adi Dhak-rayi Range, top of Pass
	3	P.M.	...	...	29·45	70	...	...	...	...	...	...	...	...	...	..	Bhimbu
19	7	A.M.	...	...	29·55	51	...	...	...	...	35	...	...	...	...	...	"
	8	P.M.	...	...	29·80	65	...	...	...	...	...	...	...	...	...	...	Doulutnugger
20	7	A.M.	...	...	29·90	60	...	...	...	...	42	...	...	...	...	...	"

Notes to Dr. Henderson's Meteorological Observations in North-west India and Yārkand.

In calculating the elevations above the sea, and the dew-point and humidity from these observations, G. H. Simmonds's Meteorological Tables have been employed.

The mercurial barometer has been considered to have been without any appreciable error; and on this supposition a comparison of its readings, corrected for temperature, as shown by its attached thermometer, to 32° F. with the tension, reduced to the latitude of the place of observation, corresponding to the boiling point of water, leads to the conclusion that the mean error of the hypsometers lies between —·1 and —·2 of a degree. As thermometers, however correctly made, acquire a minus correction after some time, and especially after repeated use in boiling water, the results of the comparison were satisfactory, and show that both the barometer and the hypsometers were correct within very moderate limits. This comparison also led to the detection of a few evident errors in reading one or other of these instruments. These errors have been noted in the register, and allowed for in the calculation of the height, but the readings remain in their original state.

A comparison of the readings of the aneroids with those of the barometer reduced to 32° F., shows that both the large and the small aneroid had large and variable errors altogether too uncertain to admit of their indications being deserving of much attention, unless they had been very recently checked, by being read nearly simultaneously with the barometer while the air temperature had not considerably changed. The aneroids were quite out of adjustment, and were certainly not compensated for temperature. It is almost inconceivable that they could have performed so badly as they appear to have done. It must be remarked also that there is a peculiarity in the readings showing so frequently a 5 or an 0 in the second decimal

place, as if they had been very roughly read.* Nevertheless the aneroid readings have been of use as checks on the barometer and hypsometers, and also when those instruments were not observed, for indicating the approximate pressure required for calculating the dew-point.

The heights have mainly been deduced from the barometer, using the hypsometer's indications when it was not observed. In the few cases where the heights depend upon the aneroid, the readings have been approximately corrected by the latest comparison with the barometer, always reducing the reaching of the latter to 32° F.

The heights deduced can only be regarded as approximations or estimations, because simultaneous observations at a lower station of reference, as a base line, could not be procured. They might, however, be obtained from some of the observatories in the north of India. Even then the frequent absence of the actual temperature of the air, at the place and time of observation, would prevent an accurate determination of the height.

It has been necessary therefore to resort to average values for pressure and temperature, determined at a lower station. The observations taken at Roorkee, latitude 29° 52′ N., longitude 77° 57′ E., 880 feet above the sea, during the years 1865-8, appeared to be the most suitable that could be obtained; but these were only for pressure, as follows :—

Months.	Barometer at 32° F.
May	28·762 inches
June	28·625 „
July	28·638 „
August	28·696 „
September	28·779 „
October	28·969 „
November	29·109 „

Vide Buchan on *Mean Pressure of the Atmosphere* in Edin. Phil. Trans. vol. xxv.

* Even with the aid of a lens, these aneroids could not be read more correctly, as the scale extended from thirty-one inches down to fourteen and eleven. [*G. H.*]

For the air temperature at the lower station the values given in *Dove's Temperature Tables* for Umbala, not far distant, and at about the same elevation above the sea, have been used, as follows :—

May	...	Mean air	100°
June	...	Temperature	96
July	...	... ...	85
August	...	... ...	86
September	...	... ...	84
October	...	... ...	75
November	...	... ...	64

Under these circumstances it was not advisable to make any allowance for diurnal range, or for casual departure from the mean range of barometer or thermometer.

It is suggested that the latitude and longitude of the principal places should be inserted in the Remark column of the register, and the heights which may have been determined by trigonometrical survey for any of the places might also be given in the remarks with advantage. These data, however, could only be furnished with sufficient accuracy by some one familiar with the places and with the results of the Government Surveys in the North of India.

R. STRACHAN.

December 14th, 1871.

APPENDIX.

APPENDIX.

A.

Description of a new Boiling-point Thermometer.

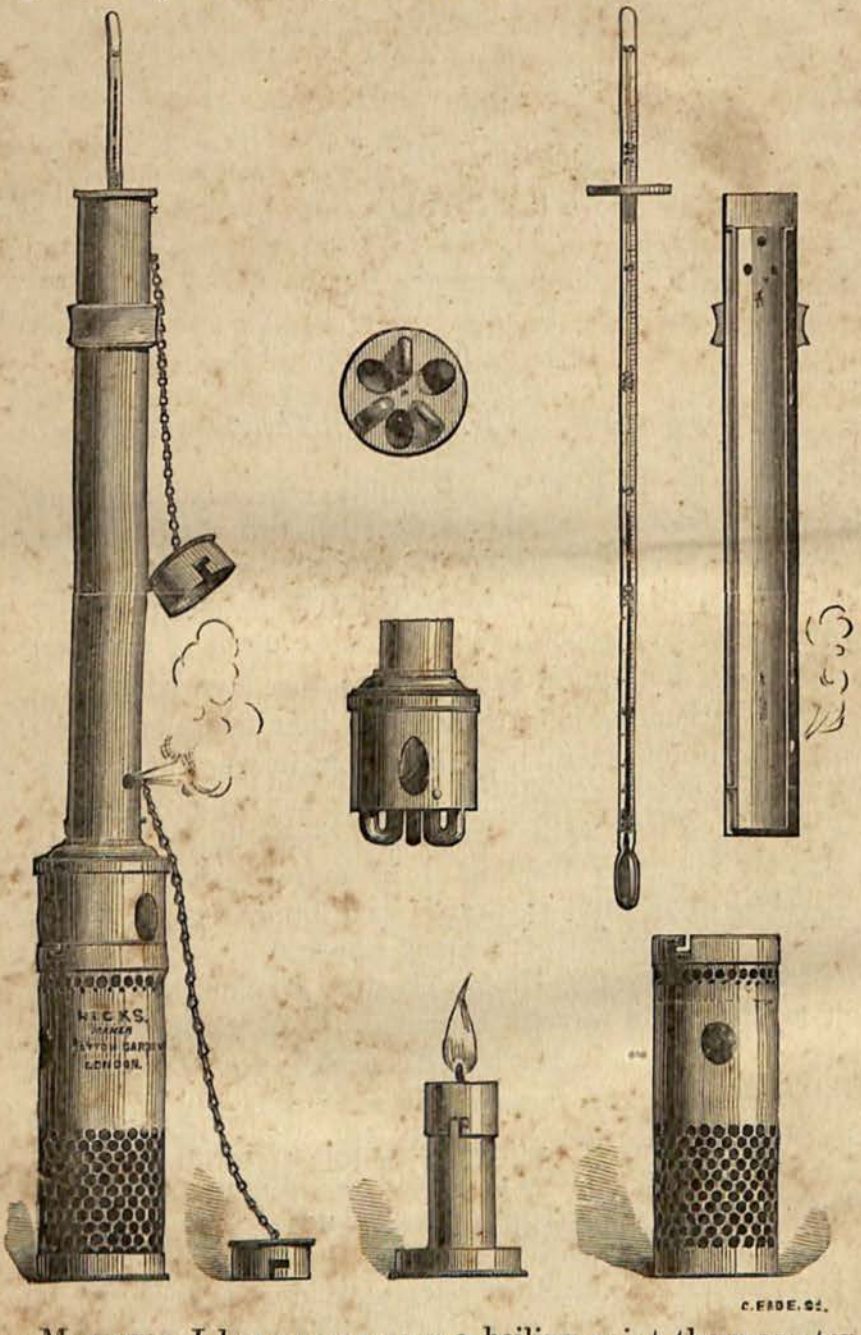
On starting for Yārkand I took with me three boiling-point thermometers of the ordinary description, two of which were used almost daily, and the record of observations shows that the temperature of boiling water, if carefully taken, and the thermometer be a good one graduated to tenths of a degree, is almost, if not quite, as reliable as the mercurial barometer in estimating heights, and it is infinitely more trustworthy than any aneroid, as the latter instrument is very apt to be put out of order by shaking and rough usage on the march, as well as by extremes of temperature.

On my return to England I set myself to improve the ordinary boiling-point apparatus, as I found that for use in the field it was defective in many respects.

Mr. J. Hicks, of 8, Hatton Garden, London, has carried out my ideas in a way which renders the instrument all but perfect. I think it might still be made considerably less bulky, however, and there is still some difficulty in getting the candle to burn without coating the bottom of the boiler with lampblack. These defects I would have remedied if I had not been obliged to leave England so soon.

The ordinary apparatus is boiled by means of spirits of wine, and as few travellers when marching over a difficult country can keep up a supply of spirits or get it replenished when the original supply becomes exhausted, the only alternative is to use a wood fire, which necessitates a supply of

firewood being carried to the top of every Pass, and causes great delay in reading the thermometer.



Moreover, I have never seen a boiling-point thermometer made self-registering; and when boiled over a blazing fire

in a gale of wind it is often extremely difficult to take the temperature exactly.

Lastly, the copper or brass apparatus in common use is so clumsy that most travellers after a time take to the use of an old soup-tin, and boil the thermometer in water instead of in steam.

The apparatus which I have invented, and of which a woodcut is here given, has the following advantages :—

I. The water is made to boil by the heat of a candle, which gives a uniform source of heat, and a measured quantity of water (about ¼ oz.) being used, the results are extremely uniform. "Composition" candles are easily carried, and are more obtainable almost everywhere. The piece of candle, about two inches long, which is used for boiling the thermometer, is pushed up by means of a spiral spring, as in an ordinary carriage lamp.

II. My thermometer is a self-registering maximum one—*i.e.*, the mercury is broken in the tube, and kept so by the presence of a very minute portion of air above the mercury, or rather between the piece which forms the index and the mercury filling the bulb. I find that a self-registering instrument of this sort can be carried to some distance without moving the index, so that it may be boiled in the dark, and be carried to one's tent some miles distant in order to be read.

III. The brass tube in which the thermometer is boiled forms the case for carrying it in the pocket.

To prevent the detached piece of mercury which forms the index from being shaken down into the bulb, Mr. Hicks makes the thermometer with a constriction just above the bulb; but should the index in spite of this arrangement get into the bulb, the instrument may again be made self-registering in the following way. To facilitate this there is a small bulb at the top of the thermometer tube, and the mercury must be very cautiously heated over a candle until this top bulb is partially filled; it is then to be inverted and shaken, when a piece of mercury gets detached and falls into the upper bulb, and when the instrument cools, this detached piece of mercury again forms the index.

The advantages of a good boiling-point thermometer over

a mercurial barometer are self-evident. I managed to carry a mercurial barometer from Lahore to Yārkand, and got it safely back as far as Lé, the entire distance being about 1500 miles, but on previous occasions I never succeeded in keeping my barometer safe for many days on the march.

It may be objected to the self-registering arrangement that the thermometer is not quite so accurate as it would otherwise be, but this objection is not considered of any weight in the case of clinical thermometers, which are usually made self-registering. And in estimating heights roughly *for the march*, either by a mercurial barometer or by a thermometer, one must always allow for a possible error of one or two hundred feet.

It seems almost unnecessary to remark that boiling-point thermometers and aneroids sent to India should be capable of measuring heights up to at least 20,000 feet.

B.

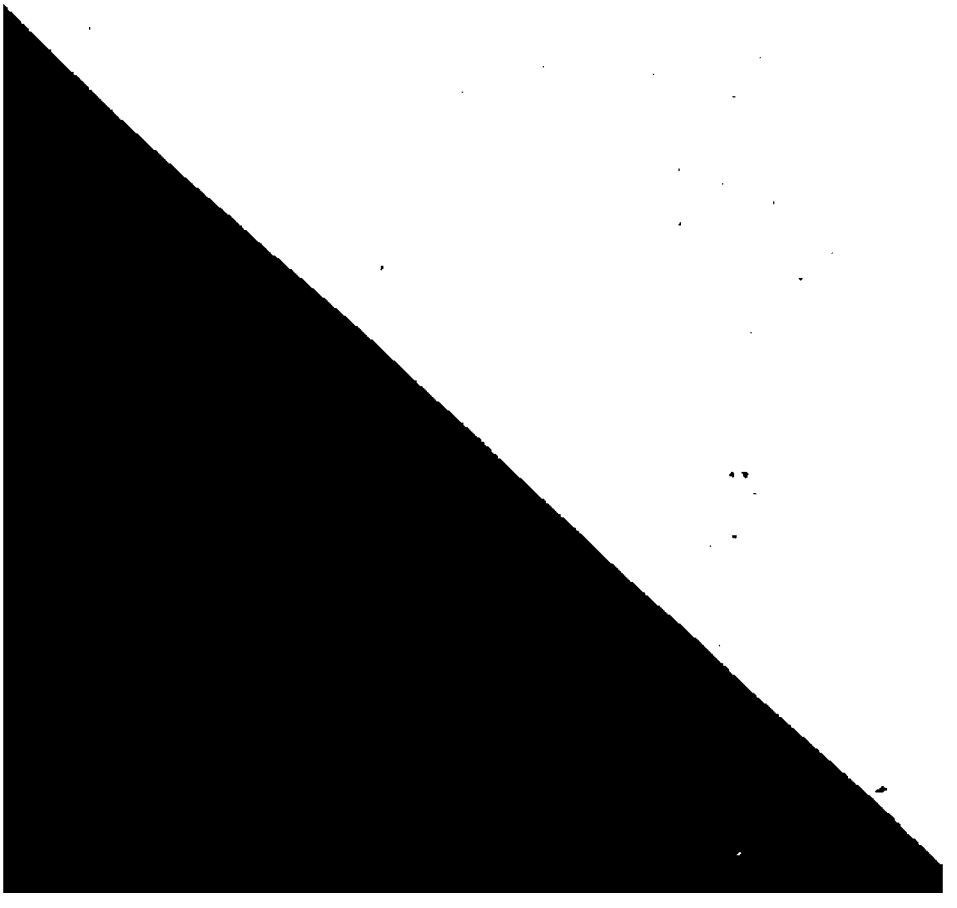
A sample of water taken from the western end of the Pángong Lake was very kindly examined for me by Dr. Frankland, who gives the following as the results of his analysis :—

100,000 parts by weight contain—

Carbonate of lime	2·10
Carbonate of magnesia	22·38
Silica	3·60
Alumina, with a trace of iron .	5·40
Sulphate of lime	4·40
Magnesia	50·88
Sulphate of magnesia	99·38
Chloride of sodium	591·39
Sulphate of soda	410·31
Chloride of potassium	107·84
Chloride of lithium	a trace
Organic matter not determined .	...
	1297·68

THE END.

00060280



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